

Founded in 1832

# RAILWAY LOCOMOTIVES AND CARS

DECEMBER 1956

A Simmons-Boardman Publication

formerly

RAILWAY Mechanical and  
Electrical Engineer

ACL Builds  
Box Cars

German Diesel  
Hydraulic  
Locomotive

Economics of  
Solid Bearings

Production Line  
Motor Stripping

Season's Greetings..

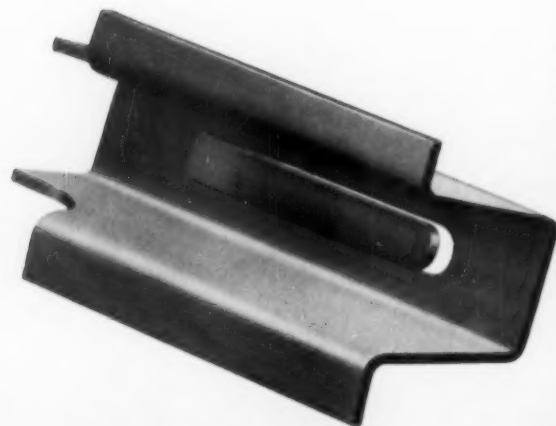


THE WINE RAILWAY  
APPLIANCE COMPANY  
TOLEDO 9, OHIO

# Tracking Down Maintenance Savings?



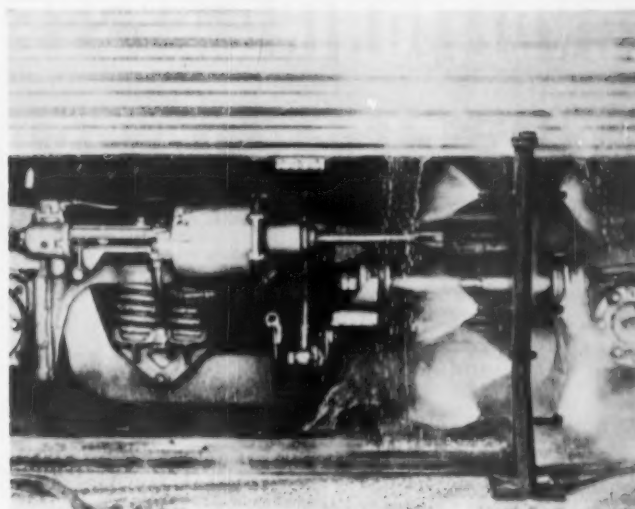
The trail leads right to Unit's new S-C Wear Plate — the SELF-CENTERING wear plate designed to cut brake shoe and wheel maintenance costs to the bone. Unit S-C Wear Plates keep your Unit brake beams centered at all times — prevent brake shoes from riding wheel flanges. Specify UNIT S-C Wear Plates on your next order — and watch those savings pile up.



**UNIT TRUCK CORPORATION**

NEW YORK

**Oakite  
gives you  
the  
IMPORTANT  
advantage ...**



## **LOW-COST END RESULTS**

**FOR EXAMPLE: one railroad  
saves \$460 a month  
on diesel truck cleaning**

There's only one *real* way to compare costs of cleaning materials ... and that's by the *results* you get from those materials.

Such a comparison erased all doubts for one Class 1 road. Truck units are now rack-washed with Oakite Composition No. 8 and kerosene. At first glance there seems to be no cost-per-gallon advantage over old method. But look at the performance and subsequent savings!

	Cost per gal.	Cost per gal. spirits	Mixture Used	Cost per gal. Mixture	Gals. used per month	Cost per Month
Competitive Cleaner	95¢	10¢	1 part to 4 parts spirits	27¢	7200	\$1944.00
Oakite Cleaner	95¢	10¢	1 part to 7 parts spirits	20.6¢	7200	\$1483.20

**RAILROAD SAVES \$460.80**

Apart from economy, these figures also prove the *quality* and cleaning *efficiency* of the Oakite cleaner. It chases all grease and grime with a 1 to 7 dilution, or about *half* the concentration of the competitive cleaner.



Export Division Cable Address: Oakite

Technical Service Representatives in Principal Cities of U. S. and Canada

This is still another success story demonstrating that with Oakite, you get the **IMPORTANT** advantage ... **LOW COST END RESULTS.**

Booklet No. F-8055 tells how many other standard Oakite materials and methods save time, work, and money. Write Oakite Products, Inc., 46 Rector Street, New York 6, N. Y.

## **RAILROAD DIVISION**

# AIR CONDITIONING SYSTEMS by "Safety"

## LEAD THE FIELD IN PERFORMANCE.....

The efficient, dependable performance of an Air Conditioning System depends on its motors and related controls for continuity of service . . .

**"SAFETY" MOTORS** are an integral part of all "Safety" Air Conditioning components. They are designed specifically for railroad service . . . to insure maximum efficiency with low wattage consumption . . . thus differ materially from commercial equipment designed for general uses . . .

**"SAFETY" CONTROL PANELS** . . . compact and simplified . . . assure ideal compressor motor starting and running performance.

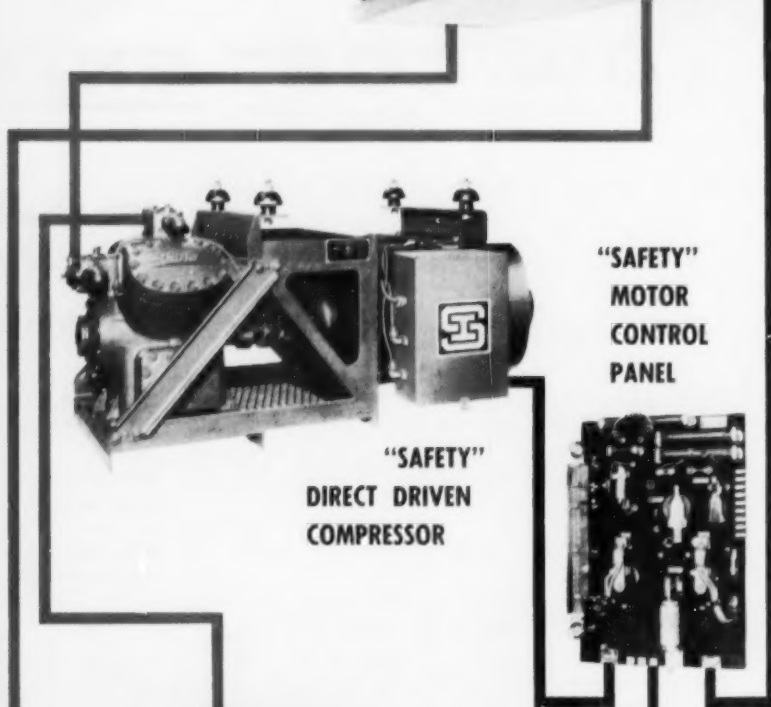
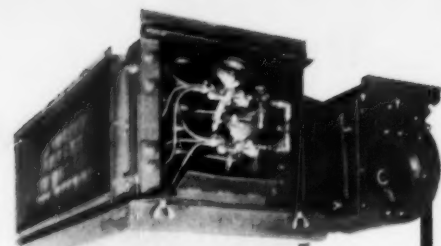
A complete **AIR CONDITIONING SYSTEM** . . . by "SAFETY" . . . including

- direct driven compressor
- evaporative or air-cooled condenser
- overhead evaporator unit
- motor control panel

assures the railroad of "Safety's" undivided responsibility for the proper performance of the entire air conditioning system.

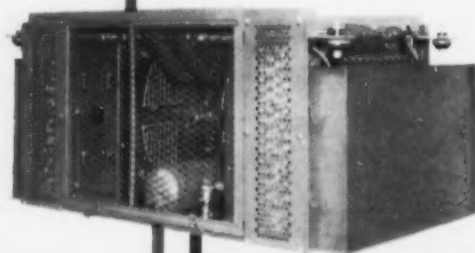
In addition to standard Air Conditioning equipment, **SAFETY INDUSTRIES** has a complete line of ceiling and package-type air conditioners designed for special types of cars and conditions. May we send further information?

**"SAFETY"**  
OVERHEAD EVAPORATOR UNIT



**"SAFETY"**  
DIRECT DRIVEN  
COMPRESSOR

**"SAFETY"**  
MOTOR  
CONTROL  
PANEL



**"SAFETY"** AIR COOLED CONDENSER



**SAFETY INDUSTRIES, INC.**

FORMERLY THE SAFETY CAR HEATING & LIGHTING COMPANY, INC.

NEW YORK • CHICAGO • PHILADELPHIA • RICHMOND • ST. LOUIS • SAN FRANCISCO • NEW HAVEN • MONTREAL

"SAFETY" PRODUCTS INCLUDE: Air Conditioning Equipment • Genmotors • Generators • Fans • Regulators • Blower Units • Lighting Fixtures • Switchboards • Luggage Racks • Motor Alternators • Dynamotors • Motor Generators • Dual Voltage MG Sets



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# RAILWAY LOCOMOTIVES AND CARS

Founded in 1832 as the American Rail-Road Journal

DECEMBER, 1956

VOLUME 130, No. 12

## MOTIVE POWER AND CAR

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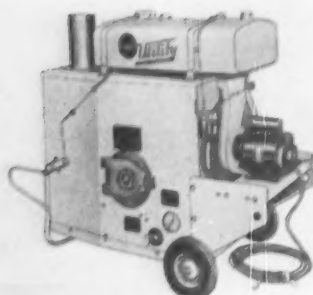
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### Portable Space Heater

These heaters include both oil- and gasoline-fired units in capacities from 50,000 to 450,000 Btu per hour. The Thrifty model is powered with a 1/3-hp electric motor. The Utility model features optional power plants, quickly interchangeable between gasoline engine and electric motor. The De Luxe is an all-automatic unit with optional, remote temperature control. American Air Filter Company, Dept. RLC, 215 Central avenue, Louisville 8, Ky.



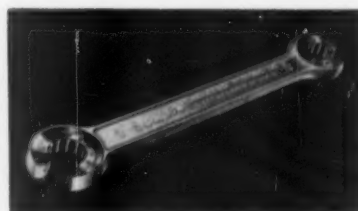
### Static Switching Control

A static switching control that replaces the function of relays has been designed to aid in the automation of various low-power switching operations. Available static components provide the five functions basic to intelligence switching. These associated components, such as power supplies and output amplifiers, are applicable to systems ranging from steel mill processing to individual machines.

Furnished in component form or in com-

plete panels and systems, this product permits combination with available regulating systems of the static type. Encapsulated, with no moving parts, and employing conservatively rated subcomponents, they are said to greatly reduce wear, fatigue and other environmental conditions.

Fail safe circuitry is provided. In addition, on return of power after any power removal, this static switching control resumes operation at the same point in the cycle where it left off. Plug-in construction, packaged power supplies, built-in wire trough, and color coding simplify panel design, construction and maintenance. Trouble shooting is performed with a standard volt-ohmmeter and monitor lights are provided for quick circuit checks. General Electric Company, Dept. RLC, Schenectady 5.



### Ratchet Wrench

This Swagelok ratchet wrench has been designed for use with 1/4 and 3/8 in. tube fittings in close quarters and in places where the degree of swing is limited. According to its manufacturer, the device grips tighter than ordinary end wrenches and is faster than box wrenches.

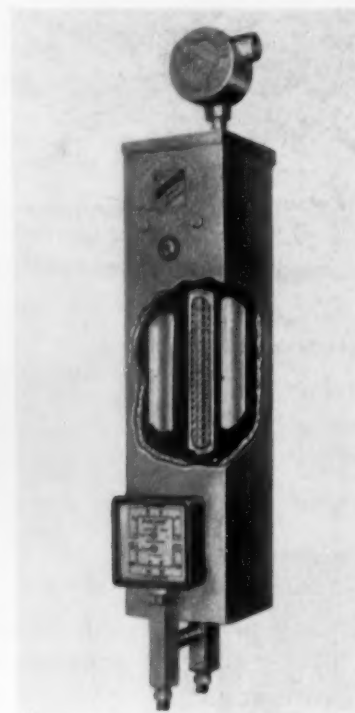
The wrench made from tool steels, heat-treated and plated, automatically equalizes torque over five corners of hexagon nuts, thus increasing strength and insuring a secure grip. The rollers are alloy steel. Crawford Fitting Company, Dept. RLC, 884 East 140 street, Cleveland.

### Epoxy Resin Adhesives

Three epoxy resin adhesives, EC-1294, EC-1474, and EC-1472, cure at room temperature to a strong solid state without forming volatile by-products. All three can be used for bonding metals to each other, to glass, and to many plastics. Each is cured with a different activator to form epoxy resin adhesives that have 100 per cent solids content.

Adhesive EC-1472 is much more flexible after curing than conventional epoxy adhesives, offering greater resistance to cracking or shattering under shock or bend loads.

The adhesives may be applied by knife coating, notched trowel, or by flowing into place. Most handle well at temperatures from 75 to 90 deg. F. Adhesives and coatings Division, Minnesota Mining & Manufacturing Co., Dept. RLC, 411 Piquette avenue, Detroit 2.



### Paint Heater

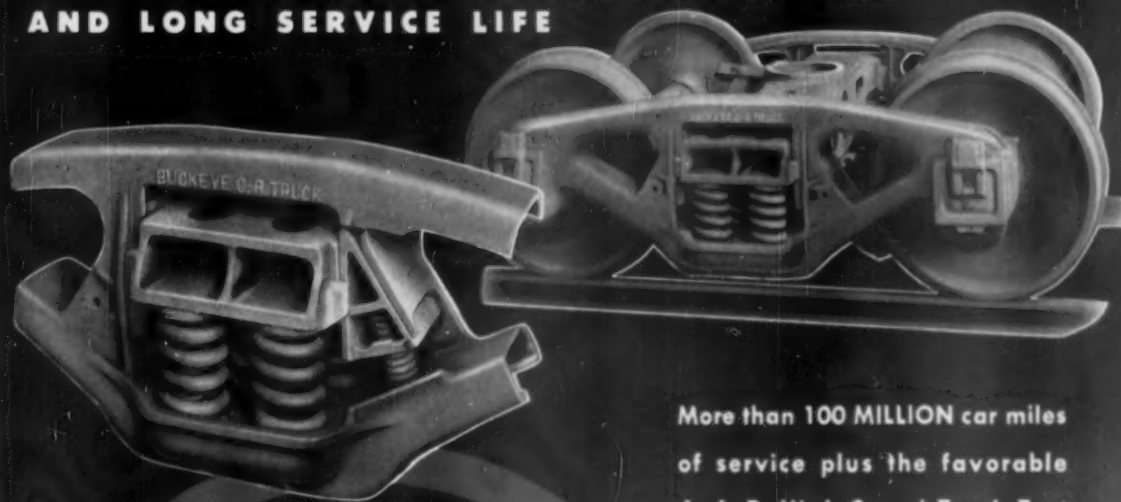
This paint heater features a removable tract, which is said to lower operating costs. Paint temperature is raised within a heated chamber. No other parts within this chamber are subjected to intense heat, thereby eliminating many causes of heater failures. Swift inspection of the paint tract is made by merely removing it from the unit. Complete replacement takes less than 5 min.

The heater fits easily into existing cold spray systems either as a portable or stationary unit. Being electrically heated, no space consuming auxiliary units are needed.

The heaters, available in standard or heavy-duty models, are UL approved operating on either 220 or 110 volts. The standard type (110 volts only) raises paint temperature to between 160 and 180 deg at the rate of 8 gal per hr. The heavy-duty model will heat 15 gal per hr within the same temperature range. Both models feature extra sensitive and adjustable thermostats and can be installed on the wall of

# Modern Freight Service..

DEMANDS SUPERIOR RIDING QUALITIES  
AND LONG SERVICE LIFE



More than 100 MILLION car miles  
of service plus the favorable  
A. A. R. High Speed Truck Test  
results show that your cars will  
meet these requirements when  
equipped with

## BUCKEYE C.R. Trucks

(CUSHION-RIDE) •

FOR COMPLETE INFORMATION... CALL OR WRITE

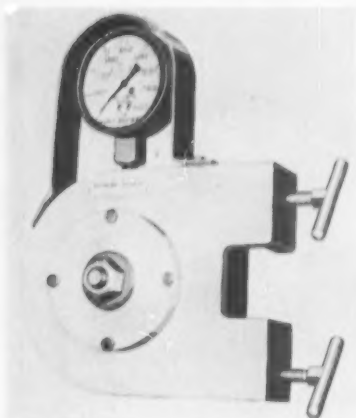
*Refer Ad. No. 11881*

*Ask for Bulletin No 201..*



# EQUIPMENT . . NEW IDEAS . . NEW USES

a spray booth. Refinements on both adapt heated air controls and recirculating systems for varied applications where it is difficult to maintain a constant paint temperature. *Binks Manufacturing Company, Dept. RLC, 3122 Carroll street, Chicago 12.*



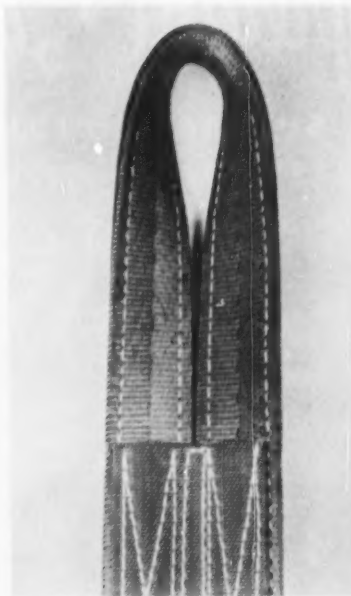
## Bolt Tension Calibrator

With this portable unit, impact wrenches are adjusted and set right on the job. Clamped to a beam or column, bolt, nut and washers are assembled in the calibrator and tightened with the impact wrench being adjusted. Bolt tension, in pounds, registers on the calibrator gage. Regulation of air pressure and/or tightening time can be made until the specified number of pounds of tension is attained. Correct tension is not dependent on torque reading methods of gaging.

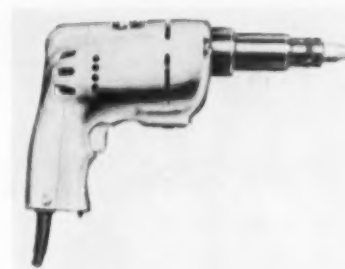
The direct-reading gage affords immediate visual proof of correct bolt tightening. This bolt-tension calibrator is suitable for all  $\frac{1}{4}$ -,  $\frac{1}{2}$ -, and 1-in. bolts that are at least  $2\frac{1}{2}$  in. long. The S-W tension calibrator weighs 50 lb and comes complete in a sturdy wooden carrying case. *Skidmore-Wilhelm Mfg. Company, Dept. RLC, 442 Green Road, Cleveland 21.*

## Cargo Slings

The Liftex nylon webbing sling for scratch-free handling of highly finished or soft materials is said to have the advantages of high strength, low weight, fast and complete recovery from shock loads, and low moisture absorption. It is chemically treated to resist grease, abrasion, alcohols, alkalis, salt water, and many solvents. No rivets or metal are used in its construction. Eye-and-eye end endless models are available in 1,  $1\frac{1}{4}$ , and 3-in. widths, and in lifting capacities of 1,350 to 5,200 lb. Reversed eye models are available in 2-,  $3\frac{1}{2}$ -, and 6-in. widths, and in



lifting capacities of 1,875 to 7,000 lb. The  $3\frac{1}{2}$ -in. wide heavy-duty model will lift up to 13,500 lb. All slings have a 5 to 1 safety factor. *Caldwell Company, Dept. RLC, 1123 Fourth avenue, Rockford, Ill.*



## Electric Screwdriver

The No. 10 adjustable and positive clutch Scrugun is now offered with a pistol-grip trigger switch feature, permitting the operator to hold the tool like a gun, driving screws from No. 8 to No. 18 sizes. A clutch keeps the screwdriving mechanism disengaged until the operator applies pressure, then the tool continues until the pressure is released. This permits the operator to have full control of the torque when driving screws in material where differing grains and densities require varying degrees of power to each screwhead.

Adjustment can be made to disengage at a predetermined pressure. This permits specifically uniform tightness on an assembly operation and is particularly adaptable to substances of constant density where greater uniformity is desired. With

a speed-control unit, screws of much smaller size can be handled. For inaccessible places a special model is available with a 90-deg. angle head. *Black & Decker Mfg. Co., Dept. RLC, Towson 4, Md.*



## Fluid Level Detector

The Dynatrol control for the detection of fluid levels is sensitive only to level variations to an accuracy of 0.01 in. The unit has no packing, floats, flexible shafts, bearings, close tolerances, vacuum tubes, long probes or critical adjustments. It can be mounted in any position, is equipped with an explosion proof motor operating at 115 volt a-c and has a rating of 1,000 psig at 150 deg F.

The device consists of a motor generator which is driven at resonant frequency by an a-c input. Output of the generator energizes a relay to control operation of any type of electrical equipment. For high-level detection, generator output ceases as a result of fluid stopping the vibrating paddle. For low-level detection, the generator energizes a control relay when fluid drops and allows the paddle to vibrate. *Automation Products, Inc., Dept. RLC, Max Roy street, Houston 24, Tex.*

## Hot Hydraulic Cleaner

The Upgrader steam-hydraulic cleaner was designed for fast and thorough cleaning of freight cars. A high velocity stream of hot water loosens and washes away dirt, residue, foreign matter and odor-forming materials.

The device generates its own high-pressure steam and combines it with cold water in an injector. The steam both heats the water and forces it through the hose and cleaning lance at 250 psi. The lance discharges a controlled stream of 180 deg F water at a velocity of 1,500 gal per hr. For



# The Engineer's Report

CASE HISTORY  
RPM DeLo Oil R.R.  
LUBRICANT

Western Pacific R.R. Co.,  
FIRM

## Special oil maintains high average mileage record!



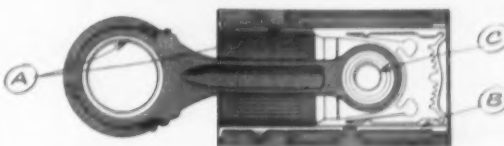
1776 CYLINDER ASSEMBLIES make up the 111 diesels in road freight service on the Western Pacific R.R. These units, as well as all passenger locomotives on the line, are lubricated with RPM DELO Oil R.R. Maintenance records of several years on freight locomotives show following average actual miles on parts removed for any reason: wristpins and bushings, 413,675 miles; pistons, 376,018 miles; liners, 354,101 miles. A representative assembly is shown in insert, just as it appeared after 476,497 actual freight miles. Note cleanliness of parts and free rings—typical of Western Pacific's experience with RPM DELO Oil R.R., the standard on the line since 1949.

FOR MORE INFORMATION about petroleum products of any kind or the name of your distributor, write or call any of the companies listed below.



TRADEMARK "RPM DELO" REG. U. S. PAT. OFF.

### How RPM DELO Oil R.R. prevents wear, corrosion, oxidation



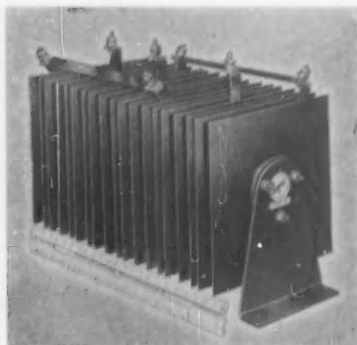
- A. Special additive provides metal-adhesion qualities...keeps oil on parts whether hot or cold, running or idle.
- B. Anti-oxidant resists deterioration of oil and formation of lacquer...prevents ring-sticking. Detergent keeps parts clean...helps prevent scuffing of cylinder walls.
- C. Special compounds stop corrosion of any bushing or bearing metals and foaming in crankcase.

STANDARD OIL COMPANY OF CALIFORNIA, San Francisco 20 • STANDARD OIL COMPANY OF TEXAS, El Paso  
THE CALIFORNIA OIL COMPANY, Perth Amboy, New Jersey • THE CALIFORNIA COMPANY, Denver 1, Colorado

# EQUIPMENT

.. NEW IDEAS .. NEW USES

stubborn dirt or grease, a solvent or detergent solution can be added automatically through the injector. The cleaner is assembled on a unit steel base and furnished with either a mobile or stationary mounting. Vapor Heating Corporation, Dept. RLC, 80 East Jackson blvd., Chicago 4.



## High Power Silicon Rectifier

Weighing only five lb and occupying only  $\frac{1}{4}$  ft, this 100-amp 200-volt unit is reported to rectify 20 kw of a-c with an efficiency exceeding 98%. It is particularly suitable for battery charging where high power d-c is required and only a-c is available.

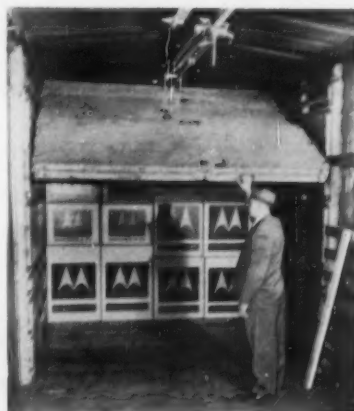
A recently designed transformer-rectifier using these silicon rectifiers is said to have converted 440-volt 60-cycle a-c into both 120- and 240-volt d-c power. With a nominal rating of 75 kw it will deliver over 100 kw. The units are now in production from 5 to 10,000 amp at various d-c voltages. Bogue Electric Mfg. Company, Dept. RLC, 52 Iowa avenue, Paterson 3, N. J.

## Locking Car Partitions

A freight-car partitioning and load-locking device, the Evans Quick-Loader, was designed for shippers of small, uniform size, and moderate weight packages. Two bulkheads divide the load into three sections at one-inch locations throughout the car. Because the device is adjustable, the sections may be equal, or not as desired. When not in use, bulkheads are spring hoisted to overhead tracks.

Operation of the bulkhead system in separating and stabilizing odd lots of freight is effected by guiding the two barriers back and forth along the car on D-F type angle tracks, dropping down partitioning sections and locking them against the stacked loads at the desired interval.

This method is said to be particularly



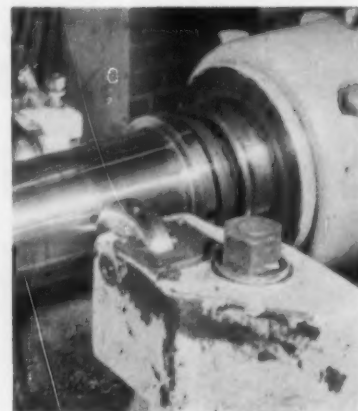
suitable for the protection of lightweight lading, such as glassware, appliances, and manufactured food products. Evans Products Company, Dept. RLC, Plymouth, Mich.



## Solderless Connectors

Terminals and connectors may be crimped to wire with more speed, using these solderless wiring devices. Formed from tin-plated copper, these tips are one of piece construction for strength, economy, high conductivity, and corrosion resistance. Wire slips into the  $\frac{1}{8}$ -in. tapered barrel and the holding power is accomplished by a series of interior barrel grooves and V-notches that grip the wire in place.

Two types are in production—Krimptite and Insultite. Insultite connectors have permanent plastic insulating sleeves. All terminals and connectors are rated beyond the current carrying capacity of the wire used and exceed the U. L. and government standards. They are available in ring, spade, hook tongue; snap-plugs and flag-type, parallel, butt, 3-way "Y," 4-way "X" connectors to fit wire ranges of 22-16, 16-14 and 12-10. Electric Terminals Corporation, Dept. RLC, 2021 Center street, Cleveland 13.



## Journal Burnishing Rolls

Cost of burnishing lathe operation, rolls, and maintenance of the burnishing tools is reported greatly reduced using Grade-82 Kennametal tungsten-titanium carbide rolls. In particular the embedding of steel particles from car journals is said to be eliminated. Other than touching up with a diamond hone when roll bearings were removed for cleaning and greasing, no appreciable wear was detected after more than 10,000 axles had been burnished. Kennametal Inc., Dept. RLC, Latrobe, Pa.

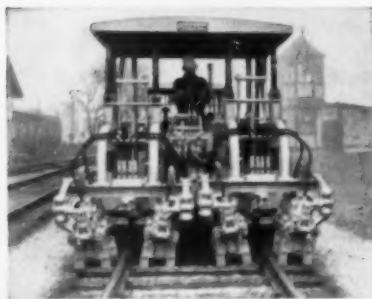


## Constant Voltage Welders

This line of modified constant voltage welders consists of 300, 500, 750 and 1200 amp units and is said to permit better and fuller control over a wide range of applications. An adjustable slope control gives a softer arc, eliminates burn-back and stubbing and provides a stable, spray-type deposit when properly adjusted for aluminum, stainless steel, and other alloys.

Advantages of constant voltage welding,

(Continued on page 70)



## Why rail freight service is better than ever today

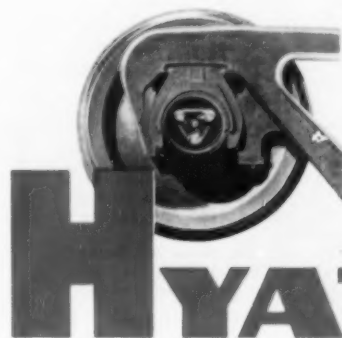
### ONE REASON IS MECHANIZED TRACK MAINTENANCE.

The picturesque "gandy-dancer" with his pick and shovel has given way to amazing machines that automatically jack up rails, replace ties, drive spikes, clean and tamp ballast. Today's better tracks help heavier trains carry more freight faster and smoother.



Watch "WIDE WIDE WORLD"  
Sundays on NBC-TV

ONE MORE BIG REASON IS **HYATT HY-ROLL BEARINGS** for non-stop freight. HYATT Hy-Rolls eliminate delays for bearing inspection or lubrication because there's a 3-year lubricant supply sealed in. HYATTS have husky *straight cylindrical rollers* with extra load-carrying capacity for extra reliability, so freight cars can safely deliver the goods on speedier schedules, unhampered by costly hotboxes. That's why 27 leading lines have already adopted the HYATT Hy-Roll as a key part of their progressive modernization programs—to benefit all America with faster, more dependable freight service. Hyatt Bearings Division of General Motors, Harrison, New Jersey.



Another  contribution to railroad prosperity

# HYATT **HY-ROLL BEARINGS**

FOR NON-STOP FREIGHT

**Tank Car  
Specifications Revised**

In collaboration with the Interstate Commerce Commission and the AAR Bureau of Explosives, the AAR Committee on Tank Cars has prepared a revised edition of the AAR Specifications for Tank Cars. It is in loose-leaf form and contains all currently effective revised specifications, each being complete in itself without reference to other tank-car specifications, with the exception of a reference to Appendix W which is the AAR Welding Code indicating the requirements and procedure to follow in the fabrication of all-welded tank-car tanks.

New materials and procedures have been added to the specifications, where applicable, and currently acceptable manufacturing and maintenance practices are reflected in the specifications and appendices.

**Frisco Starts New  
Car Shop at Springfield**

The Frisco has begun construction of a new consolidated car repair shop at Springfield, Mo. It will include a fabricated steel main shop building, 108 ft by 550 ft, and two attached wings, one to house repair machinery and the other, a one-track paint shop. The cost is estimated between \$600,000 and \$700,000.

**Miscellaneous  
Publications**

**WROUGHT STEEL RAILWAY WHEEL RESEARCH AT THE UNIVERSITY OF ILLINOIS.** An 11-page pamphlet presented at the Chicago Regional meeting of American Iron and Steel Institute October 17 by H. J. Schrader, Research Professor, University of Illinois. It covers a brief history of research on wrought steel wheels from its inception in 1933, testing procedures, standard testing conditions and results of investigation. Illustrated pamphlet shows various machines used and test results on wheels. *American Iron and Steel Institute, 150 East 42nd street, New York 17.*

**MAINTENANCE CLEANING.** 22-page "Oakite Manual of Railroad Maintenance Cleaning Procedures" describes the materials and methods best suited for interior cleaning of power units and cars; interior cleaning of locomotives and cars; cleaning trucks, underframes and running gear; parts cleaning; water- and oil-cooling system maintenance; paint removal and adhesion; roller-bearing and journal-box maintenance, and filter and air-conditioning equipment. Reference also made to cleaning equipment ranging from solution lifting steam guns and portable pressure sprayers to interior tank-cleaning units. *Oakite Products, Inc., Dept. RLC, 146 Rector street, New York 6.*

**ORDERS AND INQUIRIES FOR NEW EQUIPMENT PLACED SINCE THE CLOSING  
OF THE DECEMBER ISSUE****DIESEL-ELECTRIC LOCOMOTIVE ORDERS**

Road and Builder	No. of units	Horse-power	Service	Other detail
DULUTH, MISSABE & IRON RANGE	20	1,750	Road switch.	Cost, \$4,500,000. Deliveries to begin next spring.
FLORIDA EAST COAST Electro-Motive	10	1,750	General purpose	Approx. cost, \$1,780,000. Deliveries expected March and April.

**FREIGHT-TRAIN CARS**

Road and Builder	No. of cars	Type	Cap., tons	Other detail
ATCHAFALY, TOPEKA & SANTA FE Company shops	25	Ore	95	
	25	Mech. refrig.	..	
CAMBRIA (INDIANA) Bethlehem Steel	200	Hopper	70	Estimated cost, \$1,750,000. Delivery expected first half 1957.
CENTRAL OF GEORGIA Pullman-Standard	250	Covered hopper	70	Estimated cost, \$2,265,000. Delivery scheduled for August 1957.
CENTRAL OF NEW JERSEY ACF Industries	50	Covered hopper	70	Unit cost, approx. \$8,000. Deliveries to begin April.
KANSAS, OKLAHOMA & GULF Pacific Car & Fdry.	5	Box	70	Insulated, damage free. Unit cost, approx. \$15,000. Delivery scheduled for March.
MISSOURI PACIFIC Company shops	900	Gondola	70	These 2,200 cars to be built in 1957.
	1,100	Box	50	
	200	Pulpwood	..	
NORTHERN PACIFIC ACF Industries	100	Covered hopper	..	Estimated cost, \$1,000,000. To be equipped with roller bearings. For delivery third quarter 1957, 40½ ft, with metal slots.
Company shops	100	Stock	..	
SEABOARD AIR LINE Pullman-Standard	700	Coal hopper	70	
Magor Car	200	High-side gondola	70	With roller bearings.
Bethlehem Steel	700	Low-side gondola	50	
Greenville Steel Car	300	Pulpwood	..	With roller bearings.
ACF Industries	500	Covered cement	..	Deliveries of 2,400 cars in this order expected between June and November 1957.

**PASSENGER-CAR ORDERS**

Road and Builder	No. of cars	Type	Other detail
BOSTON & MAINE General American	35	Milk	Estimated cost, \$760,000. Delivery expected early in third quarter 1957.
CANADIAN NATIONAL National Steel Car	2	Coaches	3-ft gage cars, for Newfoundland service. Delivery expected late 1957.
	2	Baggage	
	1	Dining	
Budd	1	RDC-1	Estimated cost, \$170,000. Delivery scheduled for February.
DELAWARE & HUDSON ACF Industries	25	Baggage	Estimated unit cost, \$40,000. Delivery expected third quarter 1957.
NORTHERN PACIFIC Pullman-Standard	10	Baggage	Estimated unit cost, \$76,210. Deliveries expected to begin in June.

**INQUIRIES AND NOTES**

**FREIGHT CARS:**  
*Lehigh Valley.*—Will spend over \$6,000,000 annually for two years to repair and rebuild 1,400 coal cars, 500 steel box cars, and 500 gondola cars at company shops. Work begun in November.

*Northern Pacific.*—Rebuilding 100 40½-ft stock cars at company shops. Will have metal slots.

**LOCOMOTIVES:**  
*Pennsylvania.*—Directors have authorized purchase of 50 1,750-hp diesel-electric freight units for delivery during summer of 1957.

**TRAINS:**  
*Chicago & North Western.*—Announced plans for immediate purchase of two streamlined passenger trains, contingent on savings to be realized from revision of its Wisconsin passenger-train service.

Many of our readers have called our attention to an error on Page 90 of the November issue. The diagram at the top of the page accompanying the caption for Sketch 4 is actually Sketch 6 and should have been at the bottom of that page. The diagram at the bottom should have been at the top since it is Sketch 4.

For the benefit of those readers who color and file these Air Brake Color Schematics, we have made reprints of this entire November installment with the diagrams properly located. Drop us a line and we will be happy to mail you a corrected copy.





## STRENGTH—WHERE STRENGTH IS NEEDED

The floors of today's freight cars take a terrific pounding—from loads and loading equipment as well as from hammers and nails. That's why it is important to specify the modern flooring—N-S-F\*—that adds structural strength to critical points in the underframe, can outwear

the car itself. And N-S-F has a special antiskid surface that's safer for personnel. In fact, this flooring is so strong, smooth and safe—and provides such good blocking—that shippers everywhere recognize progressive railroading when they see N-S-F in freight cars.

\*N-S-F (T.M.): AVAILABLE STEEL FLOORING

Made and sold by

**STRAN-STEEL CORPORATION**

Detroit 29, Michigan • A Unit of



**NATIONAL STEEL CORPORATION**

*In Canada, N-S-F is made and sold by International Equipment Co., Ltd., Montreal. Complete engineering and cost data available from our representatives in Chicago, New York, Philadelphia, St. Louis, Cleveland, San Francisco, Minneapolis and Atlanta.*

16-55-44A

# Personal Mention

## Atchison, Topeka & Santa Fe

C. F. JONES, assistant supervisor of air brakes, Gulf Lines, has retired.

W. D. CURTIS appointed assistant supervisor of air brakes, Gulf Lines.

## Canadian National Montreal

R. J. PAYNE, district car foreman, appointed assistant superintendent of car equipment.

W. G. MONK, supervisor of diesel equipment, appointed assistant superintendent motive power.

J. EDMUND RICHARD, district car foreman, appointed assistant superintendent of car equipment at Moncton, N. B.

JOHN A. WALSH, district car foreman, appointed assistant superintendent of car equipment, Newfoundland district. Headquarters, St. John's, Nfld.

## Chicago & Illinois Midland

W. G. HARVEY, master mechanic, appointed superintendent transportation and equipment.

M. N. ETINGER, assistant master mechanic, appointed master mechanic.



E. C. Barnes

## Chicago, Milwaukee, St. Paul & Pacific

E. C. BARNES appointed electrical engineer, in charge of electrification department, as announced in the August issue, *Education*: Graduate in Railway Electrical Engineering, University of Illinois (1917). *Career*: assistant mechanical engineer, A. E. Staley Manufacturing Company. Started in electrification department of Milwaukee in 1920 on steam-electrification cost study. Subsequently electrification substation operator; assistant engineer, electrification department, and electrical engineer.

## New York Central

ASHLEY L. WRIGHT, general mechanical superintendent—locomotive (system), retired.

JAMES J. WRIGHT, superintendent of transportation, Western district, Cleveland, appointed to new position of director of technical research at the new research laboratory at Collinwood shops, near Cleveland.

## Norfolk & Western Motive Power Department

E. C. CROWDER, JR., assistant roundhouse foreman at Shaffers Crossing,

Roanoke, Va., appointed roundhouse foreman at Williamson, W. Va.

C. J. TAYLOR, night roundhouse foreman at Bristol, Va., appointed assistant roundhouse foreman at Shaffers Crossing, Roanoke, Va.

W. D. EMMONS, assistant roundhouse foreman at Williamson, W. Va., appointed night roundhouse foreman at Bristol, Va.

C. L. VIAR, gang foreman at Shaffers Crossing, W. Va., appointed assistant roundhouse foreman at Williamson, W. Va.

H. G. GILLESPIE, JR., foreman at Durham, N. C., appointed gang foreman at Shaffers Crossing, Roanoke, Va.

## Car Department

J. R. KELLEY, gang leader at Shaffers Crossing, W. Va., appointed gang foreman. BERNARD COOK, superintendent shops at Roanoke, Va., retired.

## SELECTED MOTIVE POWER AND CAR PERFORMANCE STATISTICS

FREIGHT SERVICE (DATA FROM I.C.C. M-211 AND M-240)

Item No.	Month of August		8 months ended with August	
	1956	1955	1956	1955
3 Road locomotive miles (000) (M-211):				
3-05 Total, steam	4,108	6,205	31,371	42,556
3-06 Total, Diesel-electric	37,246	36,723	297,129	280,061
3-07 Total, electric	741	792	5,835	5,895
3-04 Total, locomotive-miles	42,360	43,719	336,282	330,246
4 Car-miles (000,000) (M-211):				
4-03 Loaded, total	1,721	1,741	13,407	13,134
4-06 Empty, total	937	942	7,513	7,252
6 Gross ton-miles-cars, contents and cabooses (000,000) (M-211):				
6-01 Total in coal-burning steam locomotive trains	9,895	14,366	77,732	98,381
6-02 Total in oil-burning steam locomotive trains	2,054	2,995	9,168	15,861
6-03 Total in Diesel-electric locomotive trains	108,434	103,719	852,699	790,970
6-04 Total in electric locomotive trains	2,405	2,361	18,006	17,998
6-06 Total in all trains	123,708	124,246	964,579	928,983
10 Averages per train-mile (excluding light trains) (M-211):				
10-01 Locomotive-miles (principal and helper)	1.03	1.03	1.03	1.02
10-02 Loaded freight car-miles	43.6	42.6	42.8	42.7
10-03 Empty freight car-miles (excluding cabooses)	23.8	23.1	24.1	23.6
10-04 Total freight car-miles (excluding locomotive and tender)	67.4	65.7	66.8	66.3
10-05 Gross ton-miles (excluding locomotive and tender)	3,136	3,042	3,078	3,020
10-06 Net ton-miles	1,454	1,404	1,405	1,364
12 Net ton-miles per loaded car-mile (M-211)	33.3	32.9	32.8	31.9
13 Car-mile ratios (M-211):				
13-03 Per cent loaded of total freight car-miles	64.7	64.9	64.1	64.4
14 Averages per train hour (M-211):				
14-01 Train miles	18.2	18.2	18.6	18.7
14-02 Gross ton-miles (excluding locomotive and tender)	56,431	54,717	56,644	55,940
14 Car-miles per freight car day (M-240):				
14-01 Serviceable	46.6	47.7	46.6	46.3
14-02 All	44.7	45.3	44.8	43.7
15 Average net ton-miles per freight car-day (M-240)	965	968	942	899
17 Per cent of home cars of total freight cars on the line (M-240)	42.3	41.8	42.1	47.0

PASSENGER SERVICE (DATA FROM I.C.C. M-213)

3 Road motive-power miles (000):				
3-05 Steam	704	1,505	6,219	11,375
3-06 Diesel-electric	20,775	20,733	163,256	162,734
3-07 Electric	1,237	1,316	10,080	10,538
3-04 Total	22,716	23,554		
4 Passenger-train car-miles (000):				
4-08 Total in all locomotive-propelled trains	239,837	244,271	1,858,004	1,886,353
4-09 Total in coal-burning steam locomotive trains	4,485	8,500	37,990	64,513
4-10 Total in oil-burning steam locomotive trains	1,312	5,104	12,832	34,304
4-11 Total in Diesel-electric locomotive trains	219,377	215,937	1,687,032	1,667,116
12 Total car-miles per train-mile	10.09	9.95	9.91	9.82

YARD SERVICE (DATA FROM I.C.C. M-215)

1 Freight yard switching locomotive-hours:				
1-01 Steam, coal-burning	212,690	325,444	1,869,931	2,213,185
1-02 Steam, oil-burning	36,938	56,827	248,698	378,999
1-03 Diesel-electric	3,810,482	3,866,946	30,319,326	28,849,776
1-06 Total	4,064,555	4,255,635	32,465,903	31,494,501
2 Passenger yard switching hours:				
2-01 Steam, coal-burning	5,127	7,760	46,671	68,869
2-02 Steam, oil-burning	4,267	4,568	26,887	40,937
2-03 Diesel-electric	248,803	248,232	1,982,672	1,953,708
2-06 Total	282,287	289,022	2,256,385	2,269,568
3 Hours per yard locomotive-day:				
3-01 Steam	6.6	6.7	6.1	5.5
3-02 Diesel-electric	15.5	16.2	15.7	15.5
3-05 Serviceable	15.7	15.8	15.7	15.2
3-06 All locomotives (serviceable, unserviceable and stored)	14.3	14.3	14.2	13.5
4 Yard and train-switching locomotive-miles per 100 loaded freight car-miles	1.65	1.70	1.68	1.66
5 Yard and train-switching locomotive-miles per 100 passenger train car-miles (with locomotives)	.73	.73	.75	.74

<sup>1</sup>Excludes B and trailing A units.



## **CONFUSED** by too many Journal Box "Gadgets"?

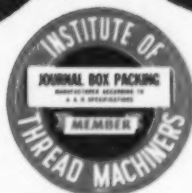
There's a lot of shouting and drum-beating these days about journal bearing lubrication. What with all the pads, packs, pouches, and parcels it's no wonder railroad maintenance men are getting confused!

Let's face it: These gadgets could make life pretty complicated. Though being used in only about 10% of the boxes now, all these contrivances present problems when your road finds them in cars in interchange... "jack" some, not others... "hook" some, not others... turn some over, leave others as is. Pretty rough on the hired help.

The fact is that the new, more uniform thread packing which our Institute developed in cooperation with the AAR is used in 90% or more of the nation's freight rolling stock for journal bearing lubrication.

Thread Packing is the most satisfactory and least expensive way known to provide efficient bearing lubrication — and recent developments make it even better! The old problem of waste grab (generally resulting from poor packing preparation or careless maintenance) can be prevented by the use of an inexpensive, approved journal stop or retainer. And the new all-weather oil adopted by the AAR helps eliminate seasonal problems.

Members of our Institute have labored long and hard to improve thread packing. The Institute of Thread Machiners' Seal on bales of new packing now guarantees quality which meets or exceeds AAR specifications. Our member companies will be glad to offer help and advice on your packing problems. Let us know if we can help you.



### **INSTITUTE OF THREAD MACHINERS, INC.**

141 East 44th Street, New York 17, New York

Atlas Processing Corp., New York, N. Y.  
Meyer Burstein & Sons, Neenah, Wisconsin  
Dallas Waste Mills, Dallas, Texas  
The J. Milton Hagy Waste Works, Philadelphia, Pa.  
John J. McGrath, Inc., Philadelphia, Pa.  
Miller Waste Mills, Inc., Winona, Minn.

National Waste Company, New York, N. Y.  
O'Neill Brothers, Inc., Philadelphia, Pa.  
The Pittsburgh Waste Co., Inc., Swissvale, Pa.  
Riverside Mills, Augusta, Ga.  
Royal Manufacturing Company, Perth Amboy, N. J.  
Southland Manufacturing Co., Inc., Norfolk, Va.  
Twin City Textile Mills Waste Co., St. Paul, Minn.

J. A. GEANHART, general foreman, locomotive department, appointed superintendent shops at Roanoke, Va.

WALTER BUDWELL, master mechanic, Norfolk Division, at Crewe, Va., retired.

H. L. SCOTT, JR., assistant master mechanic, Norfolk division, appointed master mechanic, Norfolk Division, at Crewe, Va.

#### Seaboard

S. J. JARRELL appointed assistant to chief mechanical officer at Norfolk, Va. Formerly on staff of comptroller in charge of special duties.

#### Obituary

O. A. GABBER, retired chief mechanical officer of the Missouri Pacific Lines, died on October 29.

LAWRENCE J. VERHARG, formerly assistant to chief mechanical officer, Missouri Pacific, died on October 1.

## SUMMARY OF MONTHLY HOT BOX REPORTS

	Foreign and system freight car mileage (thousands)	No. of cars set off between division terminals because of hot boxes			Miles car set off
		System	Foreign	Total	
August, 1952	2,924,917	11,658	17,535	29,193	100,192
August, 1953	2,971,020	8,638	14,160	22,798	130,319
1954					
August	2,696,135	7,568	9,742	17,310	155,756
September	2,614,432	6,740	8,882	15,622	167,355
October	2,852,825	5,182	6,985	12,167	234,472
November	2,717,219	2,515	3,467	5,982	454,232
December	2,751,644	1,501	2,294	3,795	725,070
1955					
January	2,714,070	1,813	2,701	4,514	601,256
February	2,517,483	2,266	3,970	6,236	403,701
March	2,830,398	2,717	5,076	7,793	363,197
April	2,787,705	3,471	6,485	9,956	280,002
May	2,931,850	4,860	8,664	13,524	216,788
June	2,945,955	6,080	10,226	16,306	180,666
July	2,906,558	8,006	13,635	21,721	133,813
August	2,954,439	8,555	14,358	22,913	128,941
September	2,923,592	5,896	10,469	16,365	178,649
October	3,025,177	3,966	7,182	11,148	271,364
November	2,950,228	2,010	3,972	5,982	493,184
December	2,922,034	1,819	3,774	5,593	522,444
1956					
January	2,925,109	2,029	4,302	6,331	462,029
February	2,794,161	2,570	5,611	8,181	341,542
March	3,027,684	2,517	6,212	8,729	346,853
April	2,930,309	3,202	6,881	10,083	290,626
May	3,063,427	4,672	10,903	15,575	196,688
June	2,973,732	6,777	15,125	21,902	135,774
July	2,788,347	8,484	16,067	24,551	113,573
August	3,039,173	9,891	16,892	26,783	113,474

## Supply Trade Notes

**AUTOMOTIVE RUBBER COMPANY.**—An addition, exclusively for the rubber processing of tank cars, has recently been completed at the ARco Schoolcraft, Mich., facilities. The plant, 60 by 240 ft with a working height of 26 ft, houses two parallel tracks, each with a capacity of five cars. Hanger-type doors at both ends of the building permit continuous movement of cars on an assembly-line basis. Mezzanines are built at tank-top level with catwalks to the dome platforms on the cars. Floor conveyors move cars from station to station. Plans are in progress for a similar addition to the company's plant at Houston, Tex.

**CORNELL-DUBILIER ELECTRIC CORPORATION.**—Cornell-Dubilier has acquired control of the *Tobe Deutschmann Corporation* of Norwood, Mass., producers of power capacitors.

**GENERAL ELECTRIC COMPANY.**—Repair service 24 hours a day for everything from a small motor to a locomotive has been made available in a new shop located at 6001 Tonnelle Avenue, North Bergen, N. J., to serve the Greater New York area. The new multi-million dollar structure, which combines large warehouse facilities, occupies 132,000 sq ft of floor space and is the latest in the company's chain of 53 service shops. To speed repair on locomotives, an inside-the-building railroad siding was installed.

**AMERICAN AIR FILTER COMPANY.**—C. A. Pickett has been named manager of the sales department, Product and Marketing Division.

**EDGEWATER STEEL COMPANY.**—O. B. Capps has been appointed service engineer for railroad products. Mr. Capps

was previously general mechanical inspector for the Baltimore & Ohio. R. C. Carrick, service engineer for railroad products, has been transferred to the field selling organization.

**TOLEDO PIPE THREADING MACHINE COMPANY.**—C. E. Hartsing has been appointed sales manager, succeeding Howard Mikesell, retired.

**EATON MANUFACTURING COMPANY.**—John C. Virden has been elected president.

**WILSON ENGINEERING COMPANY.**—A. T. Cox, Jr., of Cox-McGeorge Company, has been appointed exclusive railroad representative for Wilson Engineering.

**LAMSON & SESSIONS CO.**—Robert G. Patterson has been appointed assistant to president. James G. Rayburn succeeds Mr. Patterson as vice-president and general sales manager.

**EVANS PRODUCTS COMPANY.**—Arthur P. Gruner, sales engineer at Plymouth, Mich., has been transferred to the Western Savings Fund Building, Broad and Chestnut streets, Philadelphia, where he will head a new DF Loader service office.

**AMP INCORPORATED.**—AMP Incorporated is the new name of *Aircraft-Marine Products*, Harrisburg, Pa.

**JOY MANUFACTURING COMPANY.**—John E. Moody has been appointed district manager of the Boston industrial district sales office, succeeding Don L. Archibald who has been transferred to the newly formed New York Industrial district sales office.



Charles M. Ruprecht

**AMERICAN BRAKE SHOE COMPANY, NATIONAL BEARING DIVISION.**—Charles M. Ruprecht has been named president to succeed John S. Hutchins who continues as president of the Ramapo Division in Chicago.

**GENERAL MOTORS CORPORATION, HYATT BEARING DIVISION.**—Albin D. Edelman has been appointed assistant chief engineer—railroad bearings, and Ralph Altson, chief design engineer—railroad division. Mr. Edelman succeeds Richard J. Brittain, who is on sick leave.

**ALLEGHENY LUDLUM STEEL CORPORATION.**—I. R. Leheny has been appointed district manager, Cleveland district sales office, effective January 1. Mr. Leheny succeeds W. R. Kuhn who is retiring.

**ST. LOUIS CAR COMPANY.**—Eduin B. Meissner, Jr., has been elected president and general manager of the St. Louis Car Company to succeed his late father.

(Continued on page 94)



# UNI-PAK

## for dependable Journal Lubrication



### Is your soundest investment

Oil-thirsty wicking yarns of 4-ply 50% wool and 50% nylon are sewn all the way through each rugged pad, a patented Uni-Pak feature which assures a proper supply of filtered oil to the journal at all times.

The Uni-Pak core, finest foam-type neoprene of controlled density, stands up under temperature extremes, shocks and prolonged oil saturation. Fine cell structure assures maximum oil retention.

Uni-Pak's rugged container of special weave is built for years of service under the toughest operating conditions.

Uni-Pak is scientifically engineered and manufactured from highest quality materials to give maximum lubrication results for all AAR journal boxes. Installation is rapid and removal easy... that's why Uni-Pak is widely used on American railroads from coast to coast.

**240,000 Uni-Paks now in service.**

Write for Booklet



## UNI-PAK CORPORATION

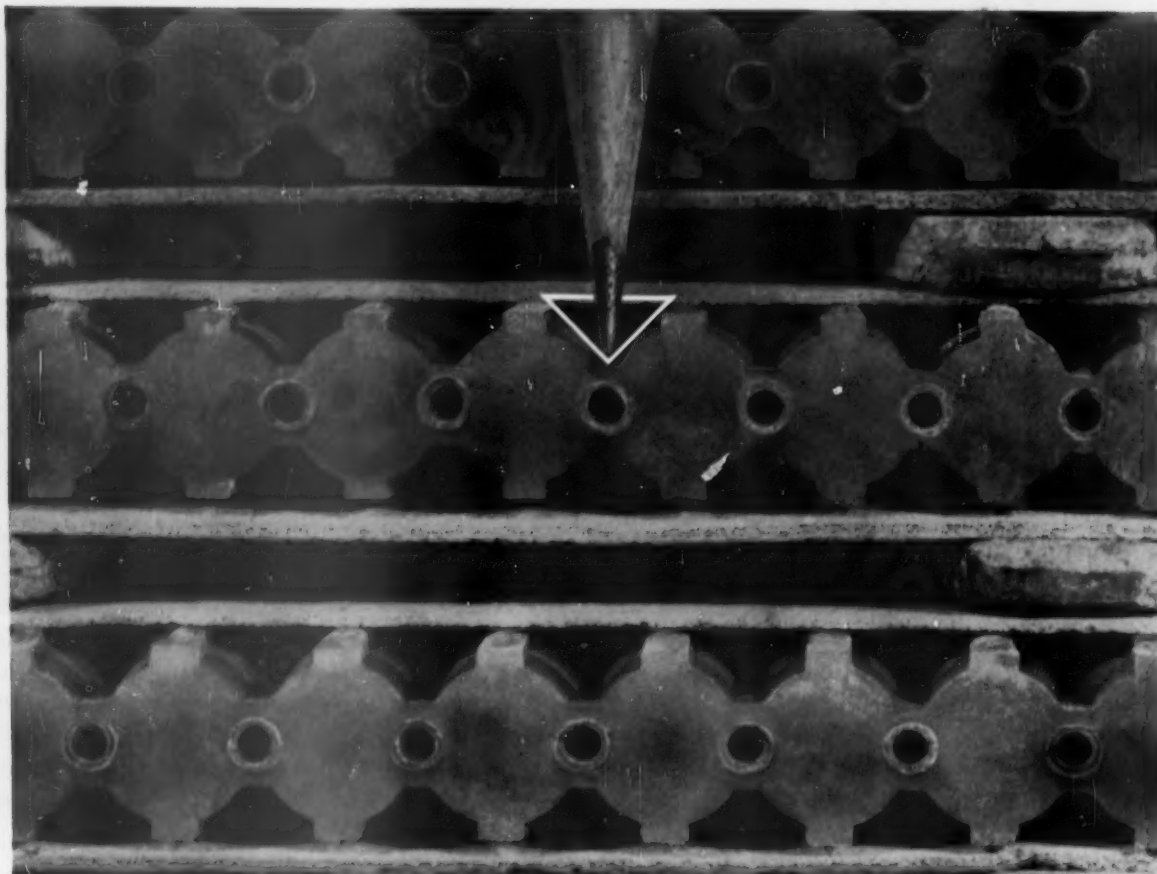
SWISSVALE, PITTSBURGH 18, PENNSYLVANIA

Offices: New York, 366 Madison Ave.; Chicago 120 So. La Salle St.; Pittsburgh, 1213 Belmont St.  
Representatives: Philadelphia, Cleveland, St. Paul, Houston, San Francisco, Montreal Canada,  
St. Louis, Richmond, Baltimore, Dallas, Washington, Louisville.



# EXIDE-IRONCLAD BATTERIES

For railway car lighting and air conditioning



**BOTTOM VIEW** shows tubular construction of positive plates in an Exide-Ironclad Battery.

## Pools of electrolyte next to plates speed heavy load response

BATTERY FOR RAILWAY CAR LIGHTING AND AIR CONDITIONING, Model EHL. Write for Bulletin No. 5168.



When the man at the control says "More power—fast," the positive plate in the storage battery says "More electrolyte—instantly." That's why the Exide-Ironclad Battery can meet heavy load demands so much more rapidly than other types of batteries. And it's the reason they outperform others in so many uses.

Adjacent to every positive plate in the Exide-Ironclad Battery are these triangular pools of electrolyte standing in reserve. When the call comes for power, the electrolyte is right there where it's needed for swift, sure response. There's nothing to slow down the action. Tiny slits in plastic power tubes let electrolyte in—yet prevent loss of active material.

Only the Exide-Ironclad Battery has this construction.

This exclusive feature is only one of the many reasons Exide-Ironclad Batteries have proved so superior in countless applications. When you order batteries for heavy duty service, or the equipment that requires such batteries, be sure to specify Exide-Ironclad. Write for detailed bulletin. Exide Industrial Division, The Electric Storage Battery Company, Philadelphia 2, Pa.

# Exide®

# HOW THE ELECTRIC ROTATING MECHANISM IN I. B. LOCOMOTIVE CRANES

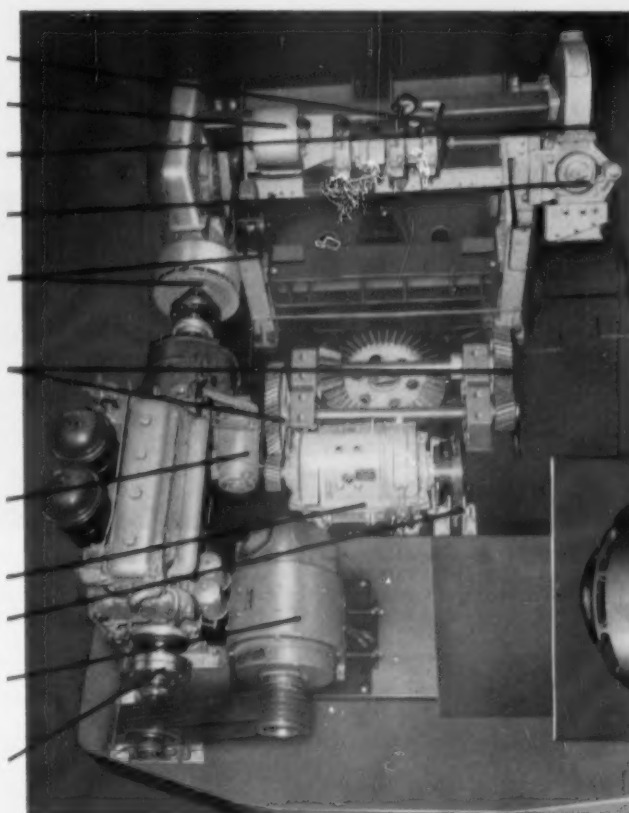
**increases operating  
speed and efficiency**



Wherever crane rotation is unusually severe (magnet and bucket operations), an electric rotation unit (optional at extra cost) can be supplied with Industrial Brownhoist Cranes. The savings in maintenance and the greater efficiency plus the elimination of friction clutches offset the cost in a short time. The generator in the electric rotating motor is large enough to supply power for magnet service,

and the complete rotation mechanism is easily accessible, being mounted on the top of the rotation bed. Reversing the flow of current through the motor, quickly and smoothly reverses the direction of rotation. • The carbody, trucks, monitor-type cab, and machinery arrangement of I. B. equipment have been equally well engineered. Write for Catalog No. 548 for complete information.

- PUSH BUTTON  
MAGNET CONTROL
- ROTATING CONTROLLER
- SAFE WORM DRIVEN  
BOOM HOIST
- AUTOMATIC BOOM  
HOIST BRAKE
- DYNAMIC CLUTCH  
AND CONTROLLER
- ELECTRIC ROTATION  
GEAR REDUCTION UNITS  
MOUNTED ON  
ANTI-FRICTION  
BEARINGS (HERE  
SHOWN WITH OIL  
CASES REMOVED)
- 1500-WATT BATTERY  
GENERATOR FOR  
STARTING AND NIGHT  
LIGHTING EQUIPMENT
- ROTATING MOTOR
- ROTATING BRAKE
- ROTATING AND  
MAGNET GENERATOR  
SUPPLIES CONSTANT  
VOLTAGE
- FLEXIBLE COUPLING



THE DYNAMIC CLUTCH between the engine and crane machinery is a driven rotor within a magnetic field assembly . . . mounted on friction bearings. A 32-step control gives accurate power response, eliminates torsional impulse and vibration and allows positive control in handling loads.



194

# BROWNHOIST

BROWNHOIST MATERIALS  
HANDLING EQUIPMENT  
GIVES A LIFT TO  
AMERICAN INDUSTRY

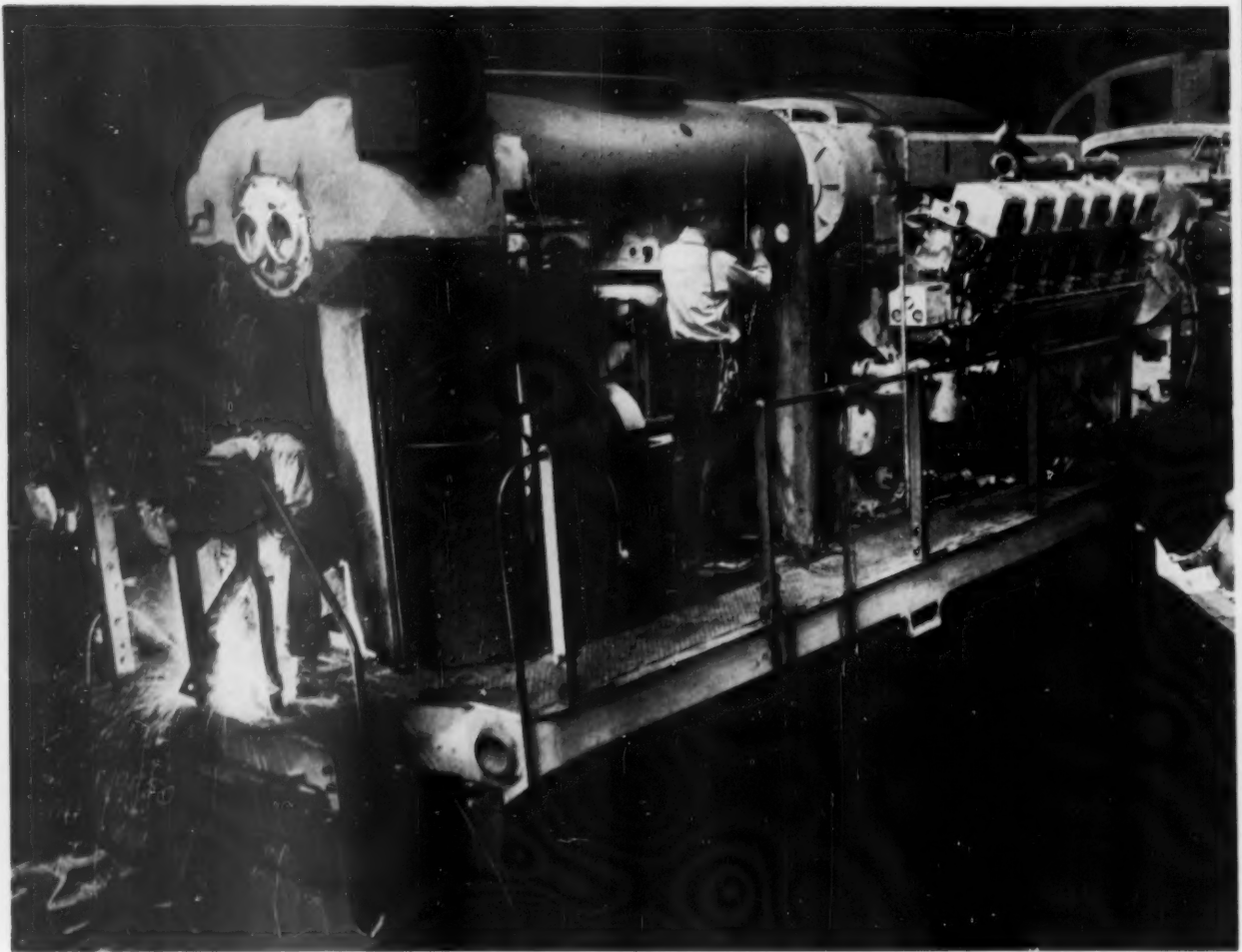


SUBSIDIARY OF



INDUSTRIAL BROWNHOIST CORPORATION  
BAY CITY, MICHIGAN • DISTRICT OFFICES: New York,  
Philadelphia, Cleveland, San Francisco, Chicago, Montreal, Canada  
AGENCIES: Detroit, Birmingham, Houston, Los Angeles.

# ALCO modernizations offer



Long-service locomotives are rebuilt in ALCO plant. Railroads may choose complete ALCO Remanufacturing Services. Work includes all engine rebuild and modernization, as well as chassis and electrical improvements. ALCO returns your locomotives upgraded to this year's specifications for service and performance.

## **ALCO's Modernization Kits and Remanufacturing Services include these important items:**

**ALCO water-cooled turbocharger**—more efficient, responds rapidly to speed and load changes, easy to maintain.

**Ni-Resist exhaust manifold**—reduces casting growth and failures.

**High-pressure fuel injection with snubber valve**—more complete fuel combustion, lube-oil condition improved, line erosion reduced.

**Ni-Resist insert pistons**—top-ring groove wear reduced, increases ring mileage.

**Grooveless and partially grooved engine bearings**—oil-film thickness and load-carrying capacity increased.

**New hardened crankshafts.**

**Oil-bath filter**—maintains high efficiency over 95 per cent, less filter maintenance, reduces engine wear.

**Simplified amplidyne control system**—fewer parts in system with simpler circuits, maintenance reduced.

**Two-piece idler gear** with inboard and outboard bearings.

**\*Crankshaft** resurfaced by chrome-plating.

**\*Serrated fit** between cap and block prevents distortion and misalignment, eliminates fretting.

**\*Items** which are normally accomplished by ALCO's Remanufacturing Services.



# improved power at low cost

## Two Methods Available for Application of Locomotive Improvements: Modernization Kits Are Installed in Railroad Shops; Remanufacturing Services Accomplished at ALCO Plant

Lower maintenance costs with improved performance on long-service ALCO locomotives can be yours when you take advantage of ALCO modernizations. New design developments in ALCO diesel engines, chassis and electrical equipment can be applied to your motive power to give you features which will upgrade your performance standards to this year's level.

**Two modernization services** are available at ALCO: Modernization Kits and Remanufacturing Services. You may select the method which suits your operation best, or utilize both services. In either service you get completely designed, tested and warranted equipment from the original manufacturer — ALCO.

**Modernization kits** include complete parts with detailed installation instructions. The kits permit complete installation of an improved, better performing system or assembly within your own shops, often during normal overhaul periods with no extra loss of operating time. At present, many railroads are applying the modernizations as a package—locomotive by locomotive. The modernizations provided by

ALCO allow your long-service locomotives to match the performance of those now coming from the production lines.

**Remanufacturing Services** offer complete engine and locomotive remanufacturing along with many other improvements at fully equipped ALCO plants. With extensive facilities, established manufacturing techniques and many years of locomotive experience, ALCO repair personnel provide the best in locomotive upgrading at moderate cost. For engines, this service is available on either a unit exchange or repair and return basis. In addition, all ALCO remanufacturing is warranted along with the equipment installed.

Let Modernization Kits and Remanufacturing Services benefit your ALCO locomotives, bring more power per dollar. Contact your nearest ALCO Sales Office for complete information, or write P. O. Box 1065, Schenectady 1, New York.

The ALCO logo consists of the word "ALCO" in a bold, sans-serif font, enclosed within a rectangular border.

**ALCO PRODUCTS, INC.**  
NEW YORK

Sales Offices in Principal Cities



Spokane, Portland and Seattle Railway applied ALCO modernizations to its 34 road freight units over an 18-month period. They reported "This modernization program has resulted in more efficient utilization of these 34 road units. This program has updated the diesel engine from a 1946 model to the 1956 model by taking advantage of engineering developments over the past ten years."

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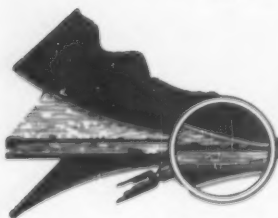
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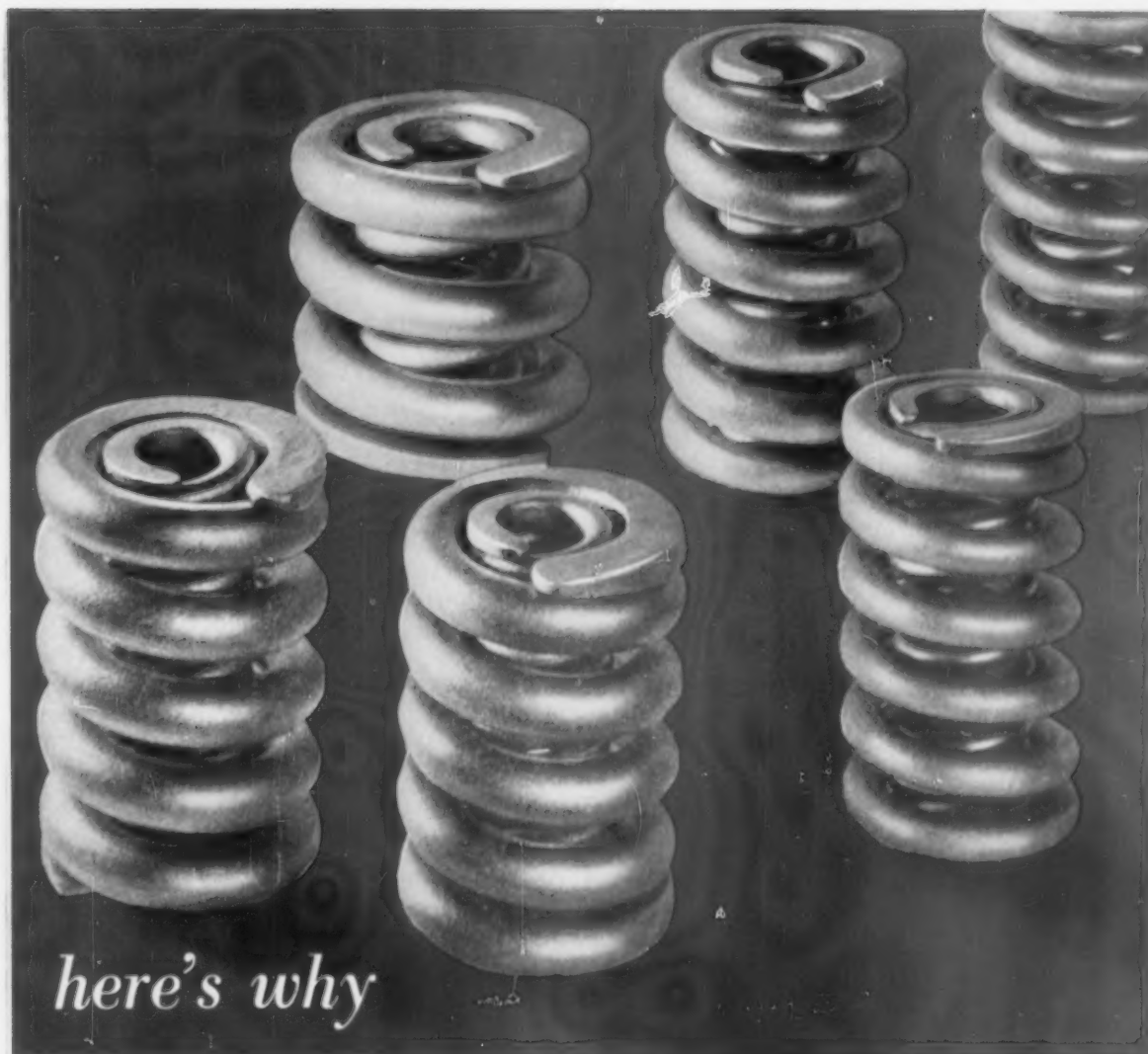
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Met-L-Wood is the exclusive distributor of Formica products in the transportation industry. Now, you can use the many distinctive Formica designs — and excellent wearing qualities — bonded to Met-L-Wood panels and doors for unsurpassed beauty and utility in passenger car interiors. Full details on Formica-faced Met-L-Wood will be sent promptly on request . . . and don't forget Formica superiority for table, counter and washstand tops!



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The exceptional service life of Crucible *fatigue-resistant* springs is *built-in* during manufacture. They're designed to outlast conventional springs many times over. Here's why . . .

**SHOT PEENING**—Crucible *fatigue-resistant* springs are given a controlled shot peening on the most modern equipment. It means a better surface condition—and imposes a negative stress on the surface to offset positive stresses set up in service. It adds up to optimum

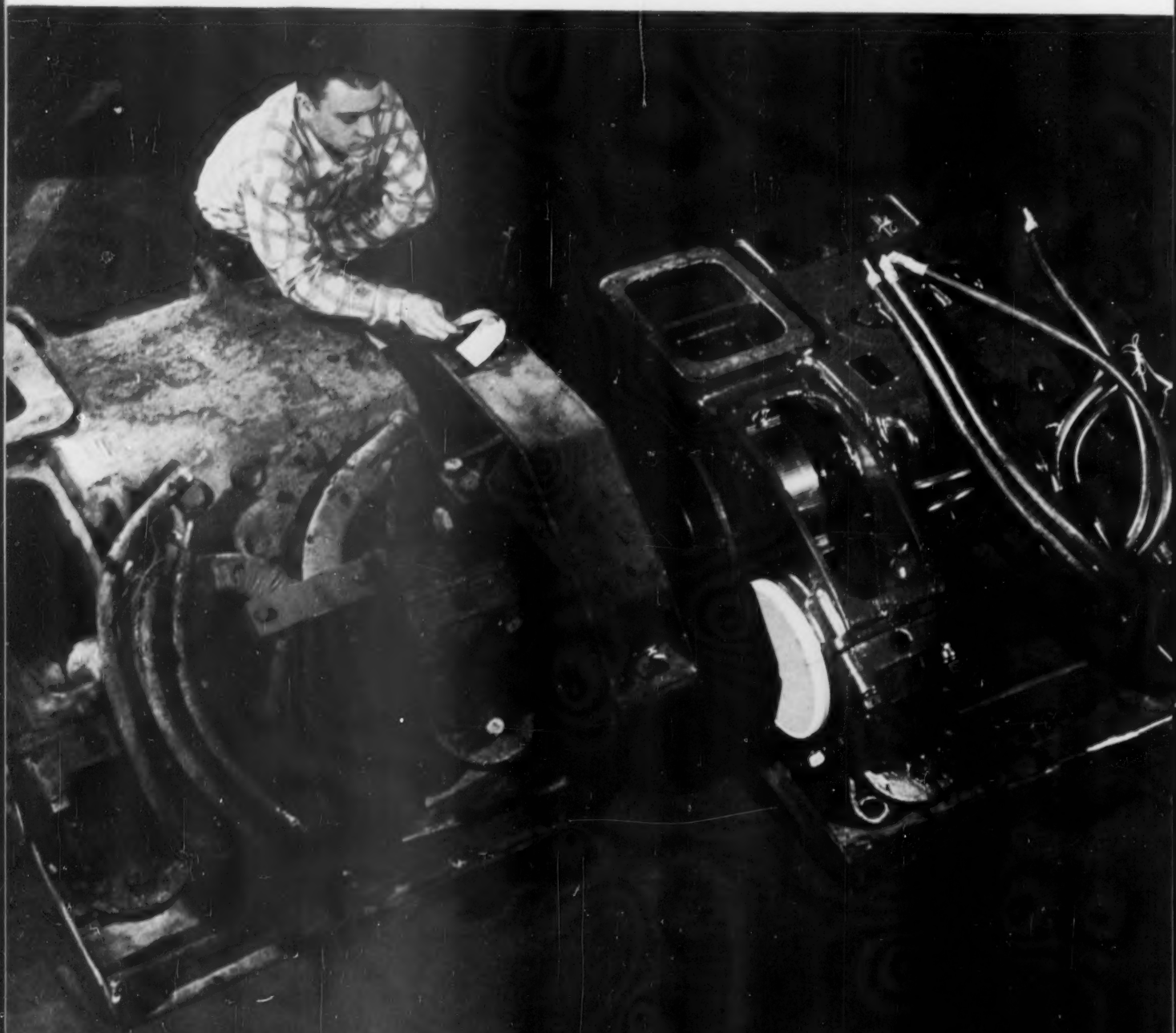
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**QUALITY CONTROL FROM ORE TO FINISHED SPRING**—As a fully integrated special steel producer, Crucible has control over quality from ore to finished spring. Inspections are continuous, and may include a final magnaflux. For full details about *fatigue-resistant* springs, write *Spring Division, Crucible Steel Company of America, McCandless Ave., Pittsburgh 1, Pa.*

**CRUCIBLE** spring division

**Crucible Steel Company of America**

# How General Electric's Unit Exchange



**YOU TURN IN YOUR  
OLD UNIT AFTER...**

**YOU INSTALL THIS  
REBUILT UNIT**

**YOU CAN ORDER** a completely reconditioned key locomotive part from General Electric, install it quickly yourself, and later, turn in

your worn part for substantial dollar credits with General Electric's Unit Exchange Plan. You get speed when you need it.



# Plan Gives You Quick, Low Cost Major Component Replacement Service

You can substantially reduce your locomotive out-of-service time and the high costs of stocking key component parts by using General Electric's Unit Exchange Plan to replace key electric components in your G-E equipped locomotives.

With this plan, you replace a work-worn component with a completely reconditioned G-E replacement part. This "like new" part has a new-part warranty. Later, when you've made the installation, you turn in the worn component to General Electric for substantial dollar credits toward the cost of the Unit Exchange Service.

You can get this service quickly—when you need it—because General Electric maintains high stock

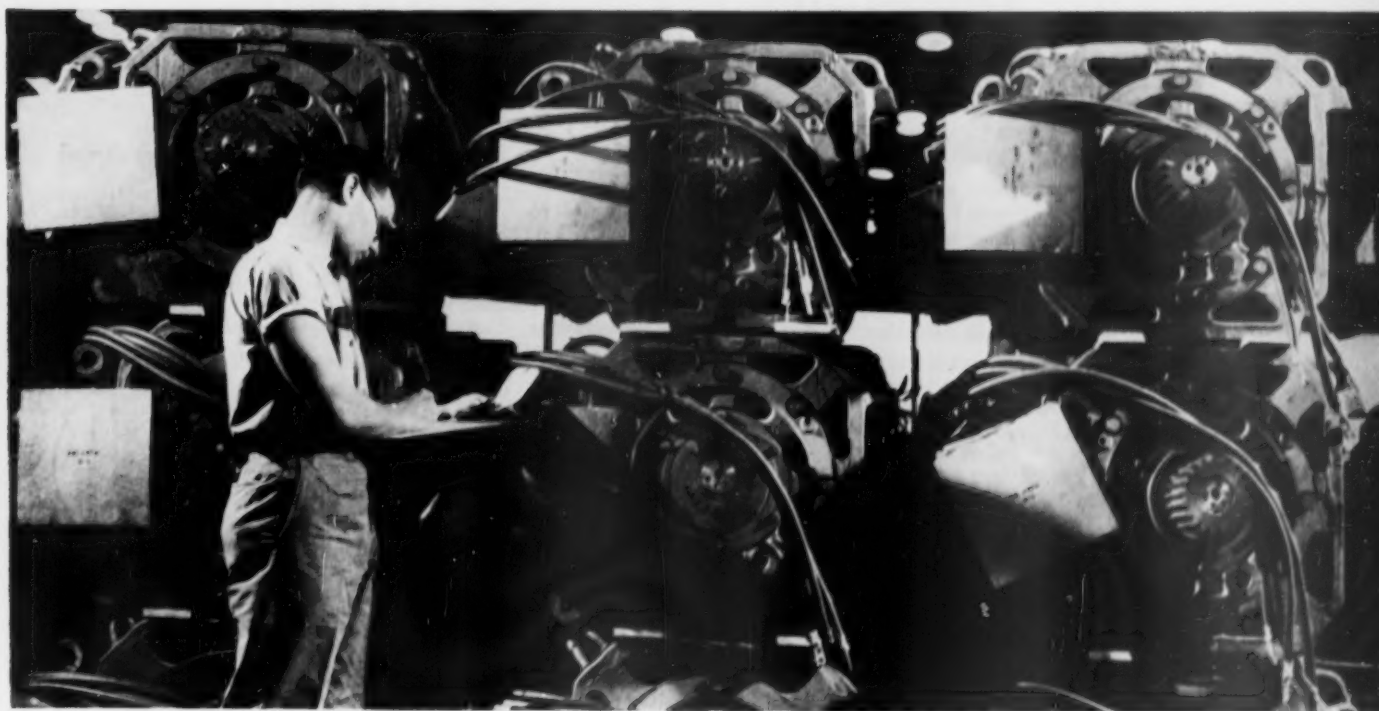
levels of all key G-E locomotive components at Parts Centers located across the country. And by letting General Electric stock and supply your key parts on an exchange basis, you free your shop space and personnel for more productive service.

General Electric's Unit Exchange Plan applies to a wide range of major electric components in your G-E equipped locomotives. For complete information on how this plan can best work for you, contact your nearest G-E Parts Center or your locomotive builder. General Electric Company, Locomotive and Car Equipment Department, Erie, Pa.

128-31

*Progress Is Our Most Important Product*

GENERAL  ELECTRIC



**ALL EXCHANGE UNITS** are disassembled for detailed inspection and complete reconditioning before they are returned to the exchange

pool for future use. That's why each component reconditioned by General Electric has a new-part warranty.



Narrow planks of high strength low alloy steel containing nickel take concentrated wheel loads of lift trucks and heavy machinery. Plastic filler in tight-grip nailing grooves between each plank allows any

conventional bulkhead arrangement and lading blocking. The filler also permits carrying fine bulk loads of all kinds. Design and construction developed by Pullman-Standard Car Mfg. Co., Chicago 3, Illinois.

## Nailable steel flooring in freight cars! Superior Performance with Nickel Alloy Steel

This flooring stays in class A condition and keeps cars in revenue service. It cuts maintenance expense as well as loss and damage hazards.

**These advantages** stem from a Pullman-Standard development that makes new use of high strength low alloy steels containing nickel.

### Cuts weight...resists corrosion

Lightweight sections of these steels give users the same strength and durability as heavier sections that would be necessary with plain carbon structural steel. What's more, these steels containing nickel offer 4 to 6 times greater resistance to atmospheric corrosion, and as a result, they retain much of their original strength over years of use.

In addition, by using the high tensile nickel steels, the new flooring provides superior resistance to impact, battering and abrasion. These steels respond readily to the cold forming and welding operations used during fabrication.

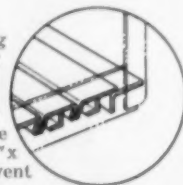
Sold under various trade-names by many steel companies, high strength low alloy steels containing nickel along with other alloying elements, offer a multitude of advantages. Learn how they can help you cut deadweight, add load capacity and prolong equipment life.

Send for a copy of "Nickel-Copper High Strength Low Alloy Steels." It's yours for the asking. **Write for it now.**



**Key plank** in center of flooring makes joints symmetrical on both ends of car. Each plank is welded to those adjoining, and to side sills, center sill and stringers. Thus made integral, floor increases over-all strength of car.

**End of floor.** Planking provides 99 nailing grooves in standard 50'-6" boxcar. Each plank is individually reinforced the entire length with 2"x1 1/4"x3/16" angle to prevent dishing.



**THE INTERNATIONAL NICKEL COMPANY, INC.**

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**ESSO DIOL RD 77**—Specifically developed for the heavy-duty engines of modern locomotives, Esso Diol RD 77 assures peak efficiency and long, trouble-free engine performance—high standards that mean extra lubrication economy.

**ESSOLUBE HD**—For smaller, high-speed diesel engines in maintenance-of-way equipment, Essolube HD detergent-type motor oil provides dependable engine protection . . . cuts oil consumption with long-lasting lubrication.

Skilled Esso technicians are ready to analyze your petroleum needs and recommend the best fuel or lubricant for your diesel equipment. For information or technical assistance, call your local Esso office, or write: Esso Standard Oil Company, Railroad Division, 15 W. 51st Street, New York 19, N. Y.



**RAILROAD PRODUCTS**



## Here's long brush life on the long hauls

The Speer #6758 MULTIFLEX® Brush is serviced-designed for outstanding performance in high hp locomotives — both freight and passenger.

Its special, patented MULTIFLEX construction gives all the advantages of a double brush — yet it operates in a single holder. Two independent sections minimize uneven wear and reduce vibration, assuring long service life and less wear on commutators.

Another Speer exclusive feature is the vibration-proof shunt connection. It's strongly and permanently imbedded in this brush with Speer's patented tamping compound.

Like all Speer brushes, every detail of the #6758 was designed for its particular job. It was tested, evaluated and modified to serve heavy-duty motive units at top efficiency.

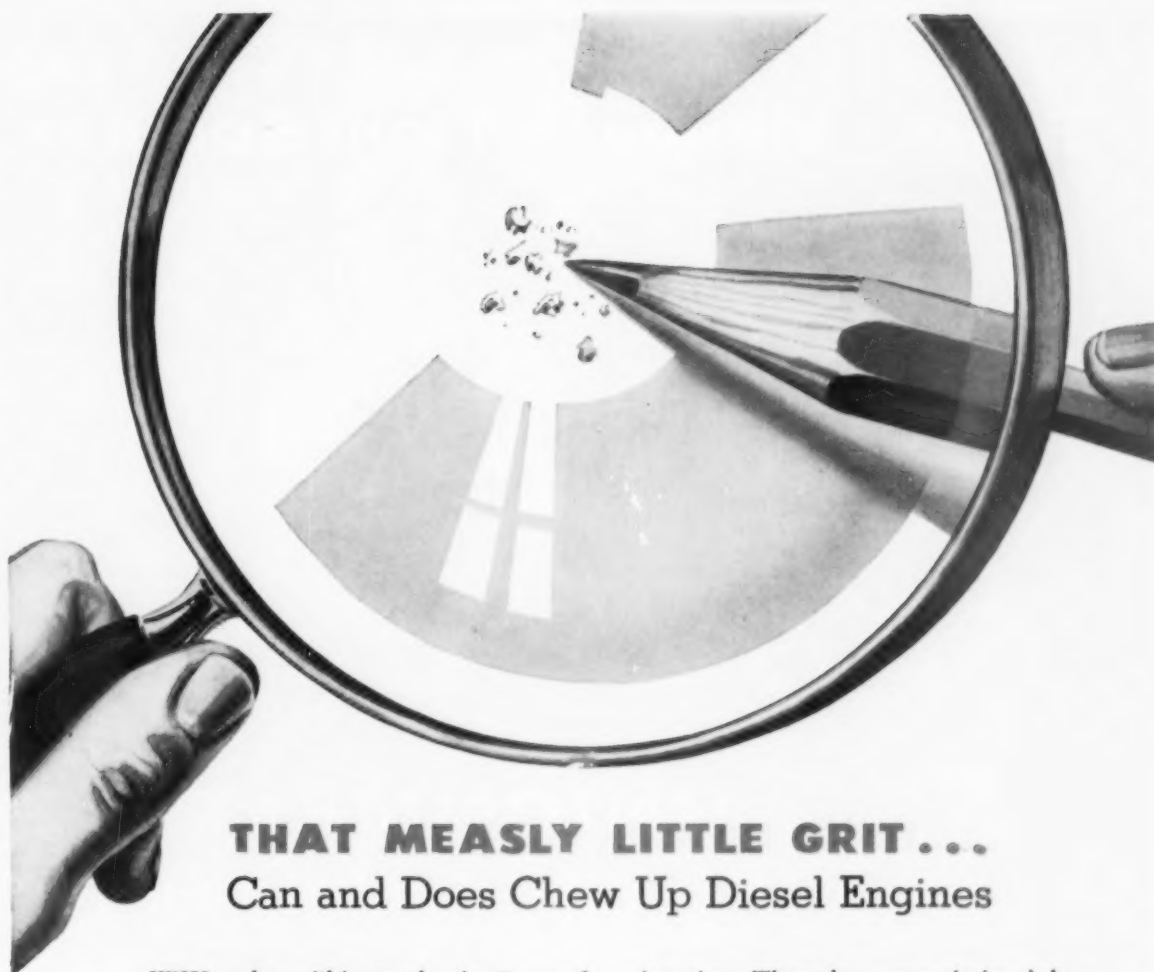
That kind of practical design makes a Speer brush the right choice for every kind of locomotive. You name your equipment — and Speer will show you high-performance brushes made specifically for your type operation.

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the new Speer Brush Catalog.*



**SPEER** Carbon Co.  
St. Marys, Pa.





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WIX makes a "big production" out of a little destruction . . . but that "little destruction" can add up to *millions of your dollars!*

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gineering. They do a superlative job of keeping oil clean. They represent a solid form of insurance against excessive downtime, maintenance cost and engine wear.

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# Saving Money in Tight Spots...

with a **UNIONMELT**  
**Flexible Welder**

A UNIONMELT flexible welder simplifies and speeds fabrication of a hopper car.

Wherever flexibility and maneuverability are required in welding, the UNIONMELT flexible welder far outperforms rigid, mechanical installations. . . Welding in corners and in tight spots is no problem with this sturdy portable unit, and top quality welds are produced at speeds up to 40 inches per minute in many operations. The combination hopper and welding head is lightweight, and requires no special skill to operate.

## Combines Advantages

This UNIONMELT flexible welder combines the speed of

mechanized installations with the operational freedom of manual welding. Wire feed unit and controls are mounted on a mobile carriage which can be moved quickly from one job to another, or from point to point on the same job. Initial investment for flexible welding equipment is considerably less than for stationary automatic welding installations—operations are economical, and maintenance costs are low.

For more information on this and other modern methods for car fabrication, call your local LINDE representative, or write today for free illustrated literature.

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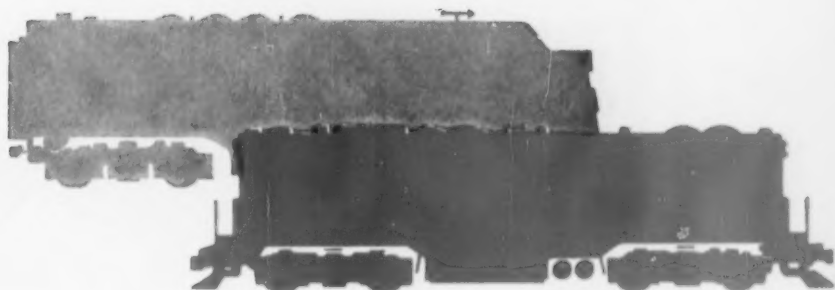
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The terms "Linde", "Oxweld", and "Unionmelt" are registered trade-marks of Union Carbide.

Supplying to railroads the complete line of welding and cutting materials and modern methods furnished for over forty years under the familiar symbol . . .



# New Locomotives For Old...



*How you can recover up to  
34 per cent of the original cost of an  
FT on the purchase of a GP9*

It's true! Here at Electro-Motive we take tired FT's and convert them—through our regular manufacturing facilities—to modern GP9's, allowing up to 34 per cent of the first cost of the FT on the conversion price.

The locomotive you get back has almost 30 per cent more horsepower and the same warranty and performance as brand-new. What the FT is worth depends on condition—but even early models bring as much as 34 per cent of their

first cost when applied to the purchase of a GP9.

Already, many railroads are using this method to supply new power at substantial savings. And, by scheduling conversions in advance of need, these same roads stand to save thousands yearly by having power to meet growth conditions as they occur. Your Electro-Motive representative can give you exact cost details for converting an FT to GP9 or F9; E3, 6 or 7 to E9; or 201A switcher to an SW900.

**To see how an FT becomes a GP9—Turn Page**



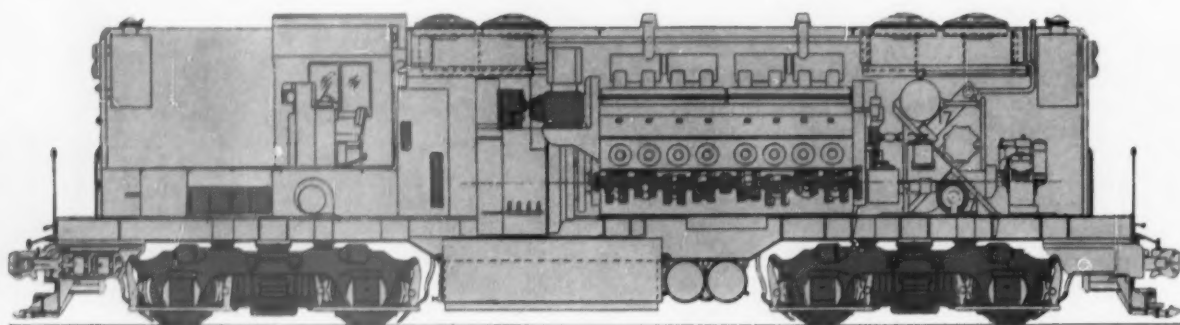
**ELECTRO-MOTIVE DIVISION**

**GENERAL MOTORS** LAGRANGE, ILLINOIS • HOME OF THE DIESEL LOCOMOTIVE

In Canada: General Motors Diesel, Ltd., London, Ontario

# Through Electro-Motive manufacturing A VETERAN FT IS CONVERTED

## *How it is done:*



Indicated in red on this drawing of a GP9 are the parts that are used from the old FT. Only these parts are used. Through Electro-Motive factory facilities they are carefully inspected, remanufactured, modernized and assembled into a new locomotive.

This locomotive is manufactured as new, on our regular production line. The same processes and

inspection techniques used in new production are used to change the old FT to a GP9. These closely controlled factory methods are your assurance of highest quality—the reason the locomotive you get back carries the same warranty and performance standards as our regular production units.



Here is how one railroad's FT locomotive looked as it arrived at our La Grange plant for converting to a GP9. This same railroad has since launched a regular program to convert all their remaining FT's.



And this is the result. This GP9 has the work capacity, economy and low maintenance features of a brand-new locomotive. In addition, the GP9 has far more flexibility and utility than the old FT.



# facilities — TO A MODERN GP9

## *The results:*

### **Greater return on investment—as high as 30%**

For the total cost of converting an FT to a GP9, the return on investment will run a minimum of 12½ per cent. Taking the additional cost alone of converting an FT to a GP9 as compared with merely rebuilding the FT in kind, the return on investment can be as high as 30 per cent for these two reasons:

#### **1. Reduced maintenance costs — up to 35%**

All the improvements in design and materials since the FT was built have been incorporated into the new GP9. In every important respect it is new—new power, increased performance, greater operating economy, and lower maintenance costs. Results show three GP9's will cost, on the average, thirty-five per cent less per locomotive mile to maintain than four FT's.

#### **2. More work capacity and earning power — 3 do the work of 4**

**Tonnage Comparison**

MPH	4FT's	3GP9's
40	5,970	6,120
50	3,820	3,900
60	2,540	2,560

With horsepower increased from 1350 to 1750 due to the new "C" type engine and numerous other improvements—three of the converted units are capable of the same work as four FT's. Chart at the left shows the tonnage comparisons in miles per hour.

### **PLANNING MATCHES MOTIVE POWER TO NEEDS**

Many railroads are taking advantage of Electro-Motive's conversion facilities to meet increasing tonnage requirements at low cost and to supplement orders of new units. By scheduling in advance of need, the conversion of older locomotives to new, these roads are able to meet increasing power requirements as they occur, not months or years later.

For complete information on Electro-Motive's pro-

gram for making new locomotives from old (there are almost as many conversions as basic units), call your Electro-Motive representative. He will be glad to give you a detailed account of the costs involved for your particular units, and also show you the profit advantages in advance planning.

Be sure to see the Electro-Motive conversion presentation when it comes to your railroad.

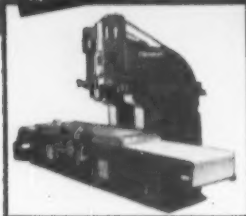
## **ELECTRO-MOTIVE DIVISION • GENERAL MOTORS**



LA GRANGE, ILLINOIS • Home of the Diesel Locomotive  
In Canada: General Motors Diesel Ltd., London, Ontario

**Place for Eight**  
*... at this table set*  
**for four**

**CINCINNATI 28"  
 VERTICAL HYDRO-TEL  
 MILLING MACHINE**  
 equipped for conventional milling



Drawing of part. Surface outlined is automatically profile milled in one continuous cut.

It's an established principle for methods engineers in the "know" ... while one or a group of parts is feeding past the cutters, a second fixture mounted on the machine is reloaded for its turn at the feeding station. In many cases handling time chargeable to cost is practically nil. Advantages of this principle are very much worth while for the milling operation illustrated here. A CINCINNATI® 28" Vertical Hydro-Tel, with 96" table traverse, is equipped with duplicate fixtures and a four-spindle head to automatically profile mill four connecting rods at one time. Surfaces milled are indicated in the drawing. This Hydro-Tel is equipped for 360° automatic profile milling, one of the seven ways in which Hydro-Tel machines are built for various types of work. The complete list includes:

- 1) Conventional milling, low series spindle speeds
- 2) Conventional milling, high series spindle speeds
- 3) Die sinking
- 4) 360 degree automatic profiling, non-selective
- 5) Die sinking and 360 degree automatic profiling, non-selective
- 6) 360 degree automatic profiling, selective
- 7) Die sinking and 360 degree automatic profiling, selective

28" Vertical Hydro-Tels have plenty of range for large work; 60", 96" or 120" table traverse; single spindle head or 2, 3 or 4 spindles. May we give you more information? Write for catalog M-1773-2. For brief specifications look in Sweet's Machine Tool File.

**THE CINCINNATI MILLING MACHINE CO.**  
**CINCINNATI 9, OHIO**

# CINCINNATI



**MILLING MACHINES • BROACHING MACHINES • CUTTER AND TOOL GRINDERS • METAL FORMING MACHINES  
 HARDENING MACHINES • OPTICAL PROJECTION PROFILE GRINDERS • CUTTING FLUID • GRINDING WHEELS**

## WHAT WILL TOMORROW'S DESIGN BE?



One of ACL's latest box (above) cars moves off the Waycross assembly line. Car design is extra sturdy to withstand today's service demands.

Rubber-coated, aluminum-colored steel lining (left) and Plastinail produce neat interior appearance. This is an innovation in freight car building.

# ACL Box Cars Break With Tradition

*Rubber-faced steel lining, high-capacity Plastinail floor, reinforced end and side construction, and special trucks with roller bearings are all used in these 40-ft., 6-in. 50-ton cars.*

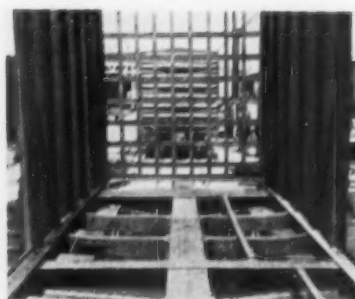
Since the total lumber requirements for each of the Atlantic Coast Line's newest box cars consists of only fifty pieces of  $1\frac{5}{8} \times 5\frac{3}{4}$ -in.

square-edge flooring and six placard boards, it can be seen that these Class O-29 cars are hardly conventional. The cars have the latest ver-

sion of the ACL's steel-ribbed nailable Plastinail flooring; and the walls and ends are lined with rubber-faced steel sheets. The smooth interior, the almost complete absence of wood in these 40-ft 6-in. cars, and the reinforced body construction may be establishing new trends in box car design. The Coast Line already has 100 cars of this type in service, and 200 more are now being built. Another road has ordered 3,000 box cars with a rubber-faced steel lining.

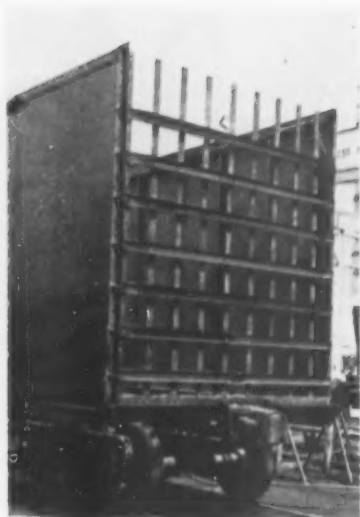
### ACL Stresses These Features For Its New Cars . . .

- All-steel construction.
- Rubber faced steel lining.
- High capacity, steel-ribbed Plastinail floor.
- Vermin-Proof and sliver-proof interior.
- Reinforced end and side construction.
- Special design lading tie anchors.
- All purpose pedestal type truck side frames with roller bearings.

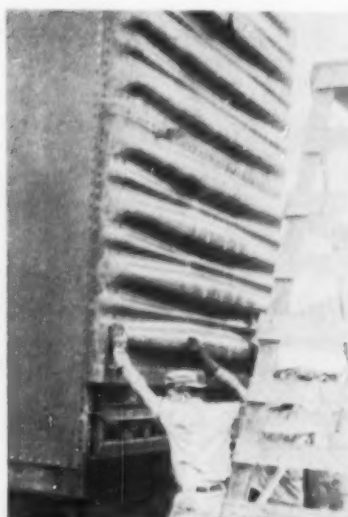


End reinforcement (above) is installed after the "package" sides are placed.

Underframe (left) is placed on trucks at first stage of car assembly operation.



Channels in end reinforcement fit into corrugations of pressed ends.



End is brought into position over reinforcement; rivets and welds to car.



Roof panels, caps and running boards are assembled and then installed.

The Atlantic Coast Line built the 0-29's at its Waycross, Ga., shop. The fifteen station assembly line and its subassembly operations turned out one of these cars each working day. The cars have been designed to be especially rugged. This meant including many structural reinforcements along with the new types of flooring and lining. This has resulted in variations from assembly procedures normally used for more conventional cars.

The cars have a center sill composed of two 41.2-lb AAR Z sections. The riveted underframe assembly includes 10-in., 24.9-lb side sill channels extending the full length of the car. Utilized in the cars built to date have been Cardwell Westinghouse, Miner, National Malleable, and Waughmat rubber draft gears, and Type E couplers. Bolsters have  $\frac{5}{16}$ -in. diaphragm plates,  $\frac{1}{2}$ -in. cover plates, Stucki side bearings, and cast steel center plates and bolster center fillers.

The trucks have 33-in. multiple-wear steel wheels, Symington Gould special pedestal-type side frames and bolsters. These ACL-designed side frames will accommodate all current freight car roller bearing assemblies and the AAR narrow-width pedestal journal box for the solid bearing assembly. Roller bearings are Timken's  $5\frac{1}{2}$  x 10-in. AP type. ASF A-3 ride control is used along with the AAR-standard  $2\frac{1}{2}$ -in.-travel truck springs.

The trucks have Creco unit brake beams, Schaefer brake levers, Schaefer bottom rod connections through the bolsters, and American Brake Shoe's "Lockey" brake shoe keys. Youngstown riveted steel sides were supplied complete with 6 x 6 x  $\frac{3}{8}$ -in. side sill angles; 3-in., 5.2-lb Z-section side posts; and 0.10-in. copper bearing steel side sheathing. The end side sheets are  $\frac{3}{16}$ -in. c-b steel shaped to wrap around the corner posts. Riveted the length of each side post are a 2 x 2 x  $\frac{3}{16}$ -in. angle and a  $\frac{5}{16}$  x 2-in. strap which subsequently serve to support the steel lining along each side. Welded to the inner side of the side posts are lading tie anchor bars which are  $\frac{1}{4}$  x 1-in. straps with a series of  $\frac{3}{8}$ -in. offsets spaced on 9 $\frac{1}{2}$ -in. centers. Notched, flanged strips backed with  $\frac{5}{8}$ -in. rounds form the lading anchors at the door posts. Side posts and corner posts are reinforced top and bottom with  $\frac{1}{4}$ -in. plate gussets. Corner posts are further reinforced with a pressed channel at

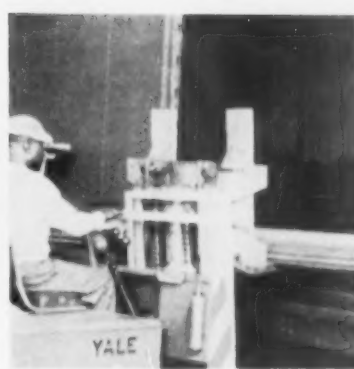




Primed lining panels are coated with adhesive; neoprene sheets are ready.



Neoprene sheet is rolled into place. Second liquid neoprene coat comes next.



Completely coated lining panels are moved to the car for application.

tached to the adjacent side posts. Extra large gussets are used at the tops and bottoms of the door posts, and extra strength is provided by an external gusset at the lower corners of the door openings. The Youngstown "46" type 9-ft steel doors have Camel fixtures.

The two-part Dreadnaught ends supplied by Standard Railway Equipment are reinforced with a series of 4-in. 5.4-lb channels fitted into the seven large end corrugations. Each of these end tie channels is attached to three short lengths of angle which are welded into the end corrugation; and the ends of the channels are shaped to fit around W-shaped corner posts and are welded in place. The entire end reinforcement (the seven channels are spaced by welding them to eight vertical  $\frac{1}{4}$  x 3-in. straps) is applied to the car before the pressed end is applied. A Standard diagonal-panel, ribbed roof is used on these cars. It is fitted with Apex metal running boards, and this entire sub-assembly is cold riveted.

The  $\frac{1}{8}$ -in. galvanized steel "hat"

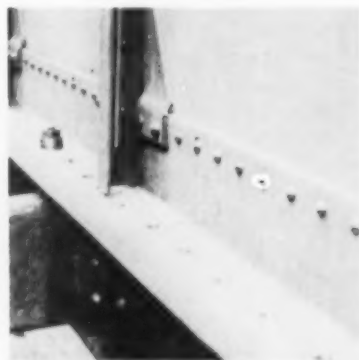
sections used in conjunction with the Plastinail floor are supported on the side sill angles, on 2 x 2  $\frac{1}{4}$ -in. floor support angles welded along both sides of the top of the center sill, and on four intermediate I-beam floor stringers. They are welded to the supports just mentioned, and also to side sill lining angles which eventually support the bottoms of the lining sheets and also serve to seal the spaces back of the lining. Overall width of the formed floor ribs ("hat" sections) is 3-in., and they are spaced on 9 $\frac{3}{4}$ -in. centers. Fifty pieces of wood sub-flooring rest on the flanges of these floor ribs and fill the space between the adjacent ribs. The wood flooring is secured to all the floor supports with MacLean Fogg Type-G floor clips.

#### Plastinail Flooring

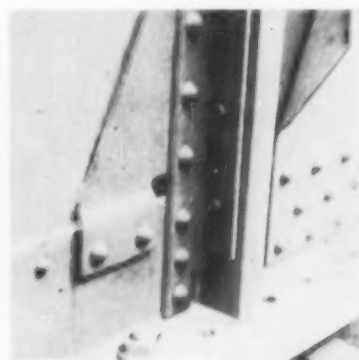
An integral part of the box car production line is the small concrete mixer in which the Plastinail composition is prepared. The material is wheeled into the car and is poured

over the wooden floor strips and troweled level with the tops of the metal floor ribs. The Plastinail is keyed to the sub floor with wire mesh. This 18-ga. galvanized mesh is purchased in 5-in. strips and is stapled over the full length of each of the wooden sub floor boards. Approximately 560-lb of Plastinail and 325-lb of magnesium chloride are used in the flooring for each car. (For a more complete description of the ACL's Plastinail flooring see *Railway Locomotives and Cars*, September, 1955, p 72.)

Instead of providing wood furring strips throughout the car during the assembly operations, mention has been made of steel angles and strips which were attached to the side posts to permit installation of the steel lining. All of this lining is  $\frac{3}{16}$ -in. steel plate. Each end lining is composed of three 36-in. wide flat plates extending the full height of the car. These plates lap over two of the  $\frac{1}{4}$  x 3-in. straps used in the end reinforcement assembly, and are seal welded to them. At the outer edges they are riveted in



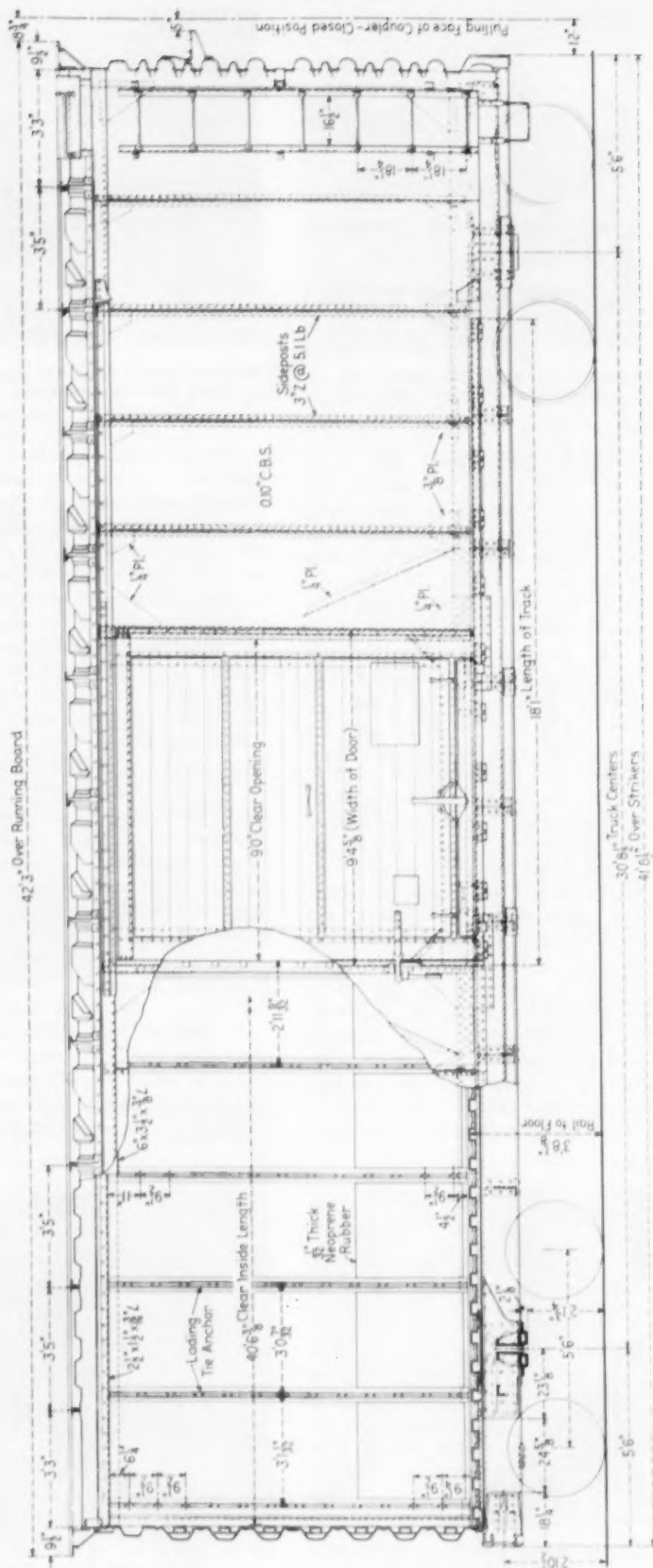
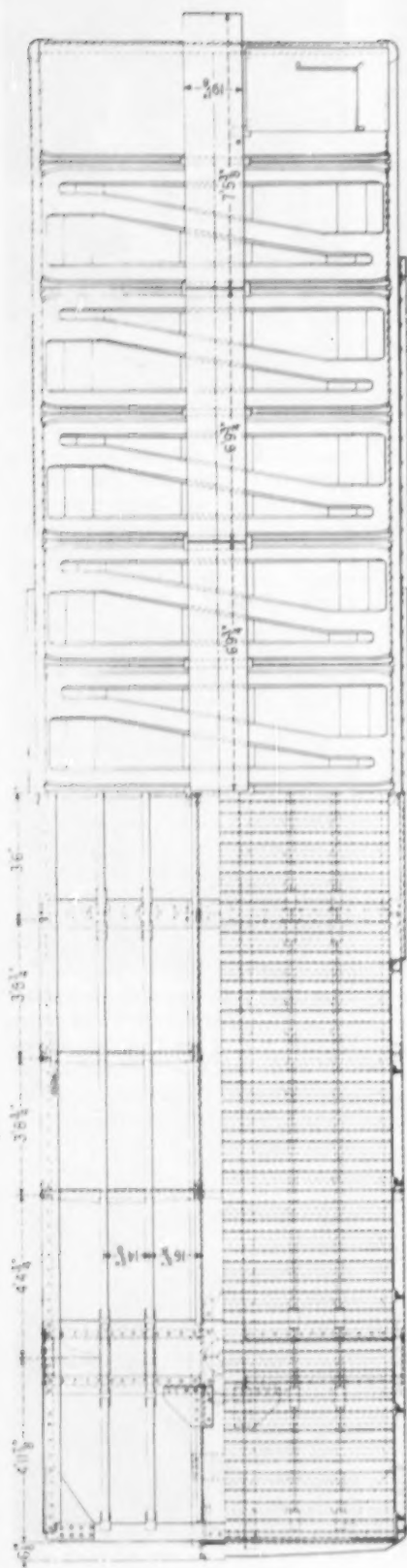
Angle on side post provides slot for insertion of edge of lining panel.

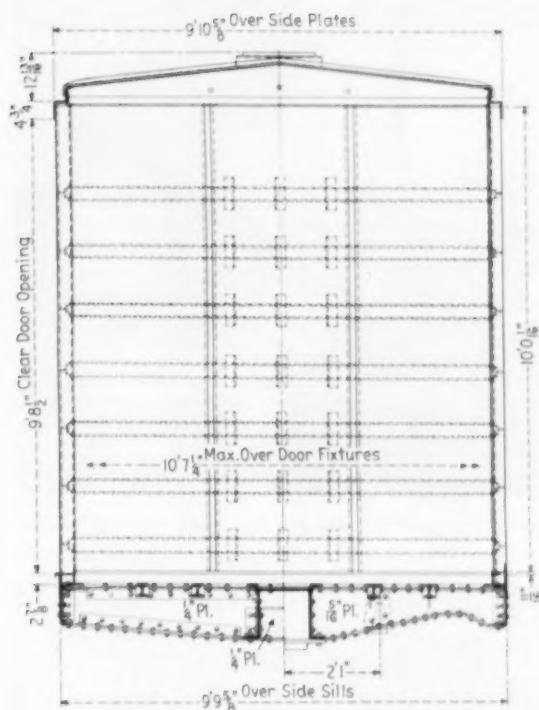


Bar on opposite side of post backs up and locates panel for welding.

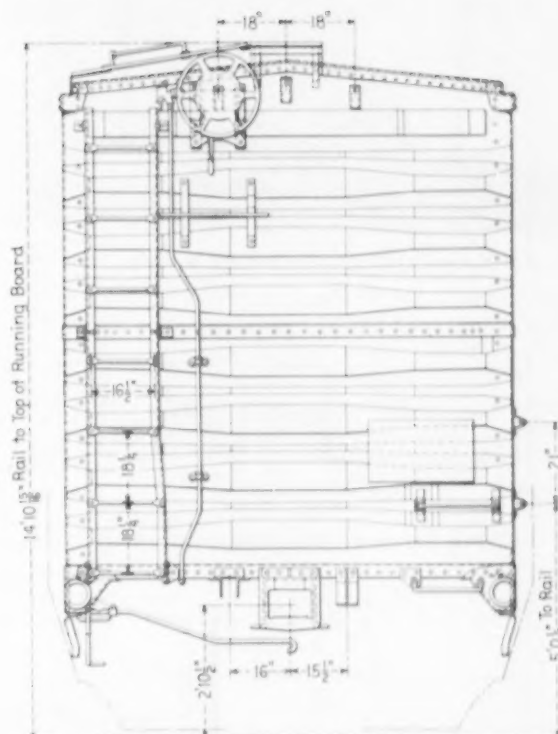


Four short angles on side sill lining angle back up lining panel base.





HALF-SECTION  
AT CROSS-BEARER



END VIEW

place through the end of the car with countersunk, flat head rivets used through the lining. These plates along with all the side lining have 1/32-in. neoprene sheets bonded to them. This neoprene extends up approximately 3-ft above the car floor. The entire lining section is also painted with an aluminum colored liquid neoprene.

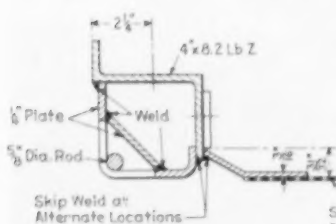
The side lining sheets are flanged at an angle of 30-deg along the two sides. This flanging serves to make the lading anchors flush with the finished car side. The neoprene coating is applied to the lining sheets before they go into the car. The ACL has established a bench-type production  
(Continued on page 39)



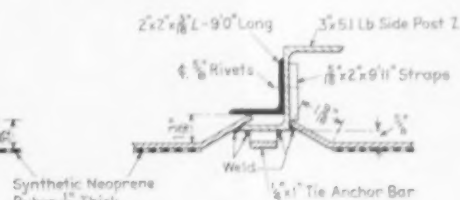
Inserted in slot on one side, lining panel is brought into position.



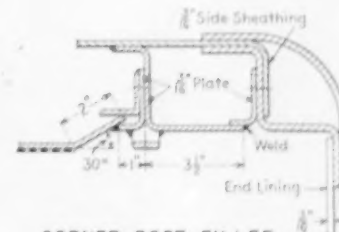
Seal weld is placed along all edges of each of the car's lining panels. Scaffold is supported by lading anchors.



DOOR POST  
DETAIL



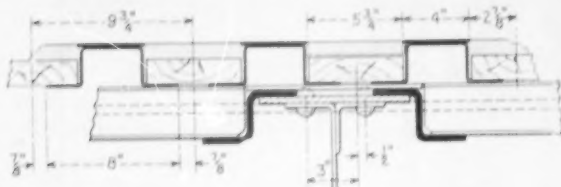
SIDE POST  
DETAIL



CORNER POST FILLER  
DETAIL



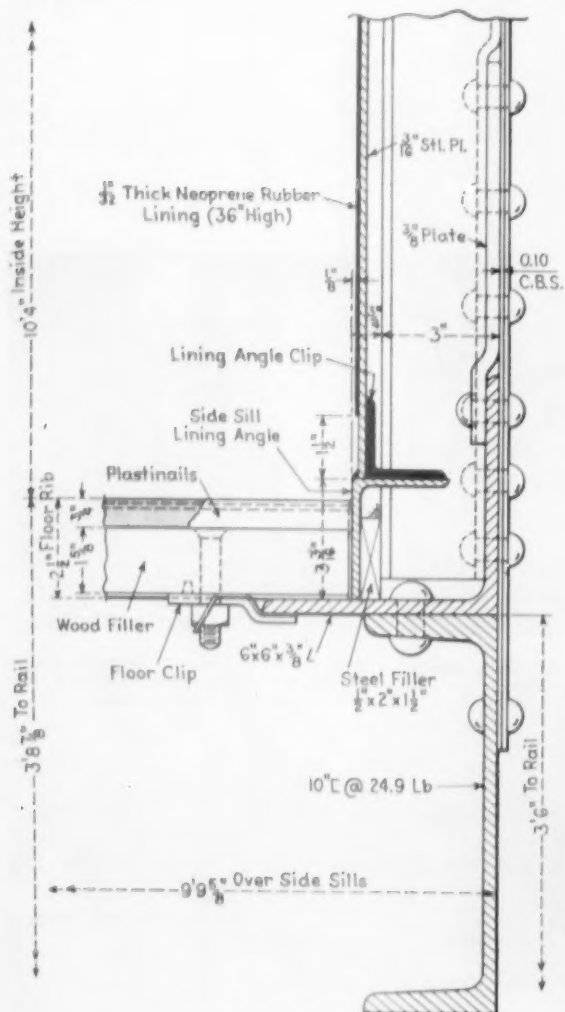
Stapling Plastinail's wire mesh reinforcement to wooden sub flooring.



Floor supports and floor construction at cross-tie.



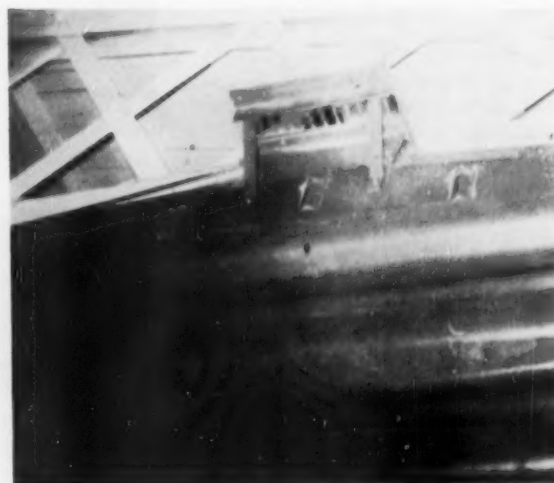
Plastinail is shoveled into place and then spread over wood sub floor.



TYPICAL SECTION THROUGH SIDE SILL



Troweled even with top of steel floor ribs; here job is half done.



Tight construction of car requires end breathers with angle covers.



(Continued from page 37)

arrangement for preparation of this lining. The sheets are received already flanged from the ACL's Rocky Mount, N. C., shop. The first step is sandblasting to thoroughly clean the surfaces. The next step is the application of a zinc chromate primer to the outer surfaces and neoprene primer and sealer to the inner surfaces. Then comes the application of one coat of aluminum-colored liquid neoprene to inner surface, and an adhesive to the area of the lining where the neoprene sheet is to be applied. Neoprene adhesive is applied also to the buffed side of the  $\frac{1}{32}$ -in. neoprene sheet and the sheet rolled into place. The neoprene is received in 36-in. wide rolls and is cut to the proper length. The entire lining section including the cold-bonded neoprene is then coated with the aluminum-colored liquid neoprene.

Two types of neoprene sheets were used in the first 100 ACL cars. Both

Gaco and Rhee primers, adhesives and neoprene sheets were successfully utilized, and Gaco aluminum liquid neoprene was used for finishing of all the lining sheets. For installation, one of the flanged edges of the side lining section is slipped into the slot formed by the flange of the Z-section side post and the leg of the 2 x 2-in. angle which is riveted to it. The other flanged edge is brought against the  $\frac{5}{16}$  x 2-in. strip riveted on the adjacent side of the next side post. The lining section is then tack welded in place. A series of short angles are welded on the top of the side sill lining angle and these serve to back up the bottom of the lining. After the entire interior of the car has been lined, all the edges of the lining are seal welded. This is done with an Airco automatic machine using  $\frac{5}{32}$ -in. electrode. Following welding, the discolored areas of the lining are touched up with the liquid aluminum neoprene.

The car is equipped with a Miner non-spin, vertical-wheel, power hand brake and an Apex brake step. All subassemblies are primed prior to application to the car. Dearborn's No-Ox-Id Red "C" Filler is applied to mating surfaces before they are brought together during assembly. The underside of the galvanized roof is coated with Insulmat and painted with standard aluminum paint having a varnish vehicle. Insulmat was also used on the lower inside areas of the car outside sheathing. The cars are undercoated with Mortex cement. The exteriors of the cars are finished with a synthetic red freight car enamel. The stenciling and the bars on the side sills and ends are done with Prismo spheres to give maximum visibility to these cars at night.

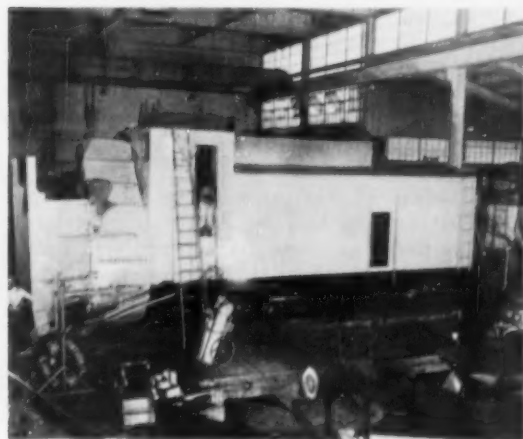
The 50-ton car has a cubic capacity of 3,836 cu ft. Its light weight is 63,500 lb.

## Labrador Line Gets Milwaukee Rotary Plow

A Milwaukee Road steam rotary snow plow has been converted to electric drive in the company shops at Milwaukee, Wisc. Power to operate the fan blades is provided by the diesel locomotive pushing the plow.

This unit has been sold to the Quebec, North Shore & Labrador connecting to Labrador's iron ore deposits. Shipped by rail to Montreal, it was taken from there by boat to Seven Islands, Que., southern terminus of the Labrador Line.

A rotary plow of this size cuts a 16-foot swath through snow at any depth. It is the third Milwaukee road plow changed over to electric drive. The first two are used on Milwaukee's 656 miles of electrified line over the Rocky and Cascade Mountains. These two can draw their power from the trolley wire as well.



# Economics of Solid Bearings for Freight Cars

The case for solid bearings summarized here has been prepared by the Technical Advisory Committee of the Solid Journal Bearing Manufacturers. Companies represented in this manufacturers' organization are Canadian Bronze Company, Magnus Metal Corporation, National Bearing Division of American Brake Shoe Company, and Railway Service and Supply Corporation.

The appraisal questions conclusions reached by Timken Roller Bearing Company studies published earlier in *Railway Locomotives and Cars*. The

first of the Timken studies was published in two parts in January and February, 1952. The most recent study appeared in our August, 1956, issue.

The other investigation referred to in this article is "Comparative Economics of Journal Bearings" prepared by the Mechanical Division of the AAR at the request of the AAR Board of Directors. While not yet released for general publication, this AAR report has circulated widely within the industry since it was issued in November, 1955.

TODAY railroad officers understandably are seeking means to improve freight service and cut operating costs by reducing road failures of journal bearings. The AAR study "Comparative Economics of Journal Bearings" comes to the conclusion that the current price of any roller bearing for freight cars is too high to permit recovery of the investment—and that from an economic standpoint roller bearings could not be expected to pay their way. These findings were established after granting to the "unproved" low-capacity roller bearing a life expectancy and failure incidence of 75 per cent of the heavy-duty passenger car bearing—a figure which the solid bearing Advisory Committee considers far in excess of that justified by their respective service conditions.

## Solid Bearing Costs

The AAR study has prompted a wide resurgence of roller bearing publicity. The most recent is the Timken brochure "The Use of Roller Bearings on Freight Cars"—reviewed in the August *Railway Locomotives & Cars*. This Timken study, according to the Advisory Committee, "exaggerates solid bearing costs, minimizes or ignores comparable roller bearing costs, and arrives at a break-even point almost three times that established by the AAR." This extreme variation between "unbiased AAR findings" and the Timken study's figures has prompted a close

examination of their major differences.

The Advisory Committee says that, in the calculation of solid bearing costs, Timken has committed several serious mistakes. Timken assumed that 6,000,000 solid bearings were applied to existing freight cars in the year 1954. As solid bearing manufacturers the committee is in a position to state accurately that only 4,360,000 solid bearings were purchased by American and Canadian railroads for freight car maintenance in that year—with approximately 600,000 additional bearings used on passenger cars and new freight cars.

A second serious error, according to the Advisory Committee, is that Timken has charged against the solid bearing assembly all accidents resulting from broken journals—regardless of cause. This means that solid bearings have been charged with 41 accidents caused by Journals Broken, Due to Defects (ICC Code 2419) and 206 accidents due to Journals Broken, Other Causes, (ICC Code 2421), in addition to the 391 accidents specifically ascribed by the ICC to Journals Broken, Overheating. At the same time, Timken has estimated comparable charges against roller bearings by using the same cost per accident as with solid bearings, coupled of course with an extremely low accident rate.

Actually in 1954, 4,109 derailments from all causes were reported. This means that better than 90 per cent of all derailments resulted from

causes unrelated to journal bearings. If roller bearings were prevalent, the cost per accident for damage to equipment would have to be increased for all accidents to provide for replacement of expensive roller bearing cars. These costs, as well as costs solely chargeable to roller bearing failures, should certainly be considered in any comparative economic study, says the Advisory Committee.

Third, according to the committee, Timken has more than doubled the incidence of cut journals found during routine inspection and repacking over the comparable incidence developed by the AAR. The AAR study reports a total of 110,516 cut journals found during these inspection periods. Timken calculates comparable costs on the basis of 258,251 cut journals. The committee considers it extremely doubtful that the latter figure will bear up under careful examination.

But what the committee calls by far the most serious error in the Timken study is the "huge" expense charged against the solid bearing for locomotive and car delays based on problematical earnings and cost of car ownership as related to average car shortages and surpluses in a given year. These charges, reaching a total of over \$107,000,000 per year, of 43 per cent of the total presumed savings, were specifically disallowed in the AAR study after thorough investigation and analysis.

Roller bearing proponents have always contended that earnings are lost because of delay days and that these problematical earnings can be counted as costs for solid bearing operation. The Advisory Committee asserts that they also have always exaggerated the number of delay days per solid bearing car in order to contend for an economic advantage.

The committee says it is unsound to consider problematical earnings as costs. If prospective earnings justify additional investment to increase hauling capacity, it should be borne in mind, it says, that for the same amount of money required to buy a given number of roller bearing cars, up to 10 per cent more cars with solid bearings can be pur-

chased—resulting in up to 10 per cent additional available car days. This means an increase in up to 10 per cent more revenue for the same initial investment, less the difference, if any, in the expense of maintaining bearing assemblies on the two groups of cars. Should these extra cars not be needed, the initial investment can be reduced by approximately 10 per cent and the return per car dollar invested would show a significant increase (up to 10 per cent) over the same investment made in roller bearing cars.

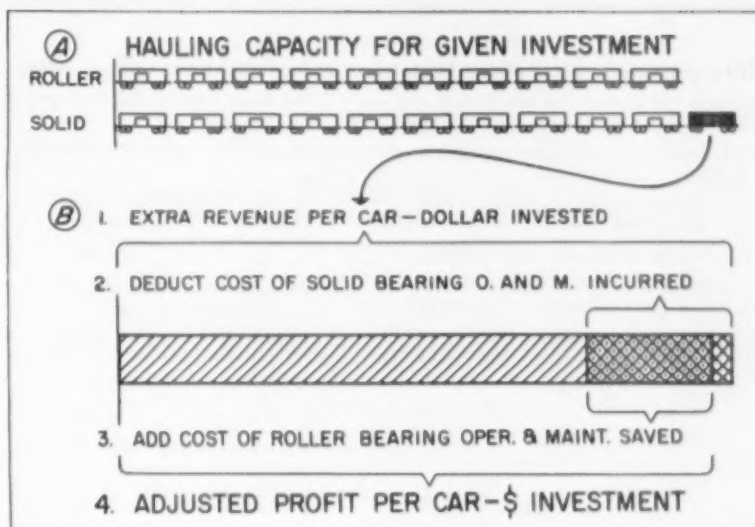
Likewise, from a practical standpoint, it is impossible to relate any increase in available car days to a reduction in equipment. To illustrate: in 1950 the railroads with 1,721,269 cars moved 38,902,641 carloads of freight, whereas in 1954 with 1,736,057 cars 33,914,953 carloads were moved. The cars were loaded 22.6 times, or once each 16.15 days, in 1950; and were loaded 19.5 times, or once each 18.7 days, in 1954. If in 1954 cars had been loaded at a rate of 22.6 times per year, as in 1950, theoretically only 1,500,662 cars would have been required.

Actually, no such car saving could ever be effected, because the railroads' car inventory requirements are determined by peak loads and seasonal demands of specialized commodities—grain, coal, etc. The car pool, like working capital, must be sufficient to meet any emergency.

If what it calls realistic solid bearings costs for damage to equipment, for cut journals found during routine inspection and periodic reackling, and for bearing consumption are used, and if exorbitant costs for delays are eliminated from consideration, says the Advisory Committee, the annual savings per car with roller bearings would not be sufficient to justify their use—even using the Timken figures.

### Roller Bearing Life Expectancy

From an engineering analysis, however, the committee finds indications that the 25-year life and average annual replacements of 1.9 per cent which Timken has assumed may never be realized with the low-capacity roller bearing. Should this life expectancy not be reached it would seriously affect the Timken estimates of hot box costs, damage to equipment, and inspection periods—as well as annual replacement costs. There



follows a digest of the Technical Advisory Committee's examination.

"The commonly accepted figure for roller bearing life in passenger service is 25 years. The low-capacity freight car roller bearing is said by its manufacturers to have a service life of only one-fifth the passenger car roller bearing. If then, we evaluate the life expectancy of the passenger car roller bearing in freight service, and divide by 5, we can arrive at a reasonable life expectancy of the thus-far-unproved, low-capacity freight car bearing.

"Obviously, there are many conditions in freight car service that are different than passenger car service, and they all have an effect on bearing life. Five principal factors can be used to correct for these differences. These are the Load Factor, Mileage Factor, Speed Factor, Impact Factor, and Vibration-Thrust-Brake Load Factor. Each one of these factors has been assigned a numerical value, and their product gives a Comparative Life Factor which multiplied by passenger bearing life and divided by 5, yields a reasonably accurate estimate of the freight car bearing life. Thus, when:

$L_f$  = Freight Car Bearing Life in Years

$L_p$  = Passenger Car Bearing Life in Passenger Service in Years, or 25

$W$  = Load Factor, or 1

$M$  = Mileage Factor, or 4.45

$S$  = Speed Factor, or 1.58

$I$  = Impact Factor, or .2

and

$V-T-B$  = Vibration · Thrust · Brake Load Factor, or .85

We may derive the following formula:

$$L_f = \frac{L_p (W.M.S.I.V-T-B)}{5}$$

"The product of the values assigned to  $W$ ,  $M$ ,  $S$ ,  $I$ , and  $V-T-B$ , or the Comparative Life Factor, is 1.196. This value, applied to our equation, establishes a life expectancy for the low-capacity roller bearing of just under 6 years.

"How the values for the component factors are determined is explained below.

**"Load Factor**—The AAR Committee on Journal Roller Bearings in Circular D.V.-1361 of May 26, 1956, recommends that 'Freight car roller bearings be designed for a minimum life expectancy of 500,000 miles service with a load factor of 80 per cent, equivalent to full rail load in one direction. "Life expectancy" is defined as that life at which 10 per cent of the bearings may have been replaced for fatigue.' Eighty per cent of the full load rail weight of the 169,000 pounds is 135,200 pounds rail weight. This rail weight, less wheel and axle weights of 9,000 pounds, amounts to a weight per bearing of 15,775 pounds.

"The maximum load per 5½ by 10 in. axle permitted in passenger service is 34,000 pounds for speeds up to 85 mph (AAR Manual, page



TABLE I  
**Life expectancy calculations for low-capacity freight car roller bearing**  
*(Projection of Comparative Life Factors of 5½ x 10 Roller Bearing for 100,000 Lb Capacity Freight Car)*

ITEM		ITEM	
1. Freight Car Wt. on Rails (80% Load Factor)	135,200 Lb	11. Comparative Vibration, Thrust & Brake Load Factor Freight Over Passenger Bearing	0.85
2. Weight of Wheels & Axles	9,000 Lb	12. Projected Comparative Life Factor Freight Over Passenger (Product Lines 7, 8, 9, 10 & 11)	1.196
3. Freight Car Wt. on Bearings (Line 1—Line 2)	126,200 Lb	13. Passenger Car Roller Bearing Life in Passenger Service in Yrs.	25
4. Load per Freight Car Bearing (Line 3÷8)	15,775 Lb	14. Theoretical Life of Passenger Car Roller Bearing in Freight Service in Years (Line 12 x Line 13)	29.90
5. Load per Passenger Car Bearing	15,775 Lb	15. Theoretical Life of Freight Car Roller Bearing Over Passenger Car Roller Bearing (Timken Report)	0.20
6. Ratio of Load Freight Over Passenger Brg. (Line 4/Line 5)	1.0	16. Projected Theoretical Life of Freight Car Roller Bearing in Freight Service in Years	5.98
7. Comparative Load Factor Freight Over Passenger Bearing	1.0	17. Life of the Freight Car Roller Bearing Compared to the Passenger Car Roller Bearing (Line 16/Line 13)	23.92%
8. Comparative Speed Factor Freight Over Passenger Bearing	1.58		
9. Comparative Mileage Factor Freight Over Passenger Bearing	4.45		
10. Comparative Impact Factor Freight Over Passenger Bearing	0.20		

D-4-1956). Over 85 mph, it is limited to 32,000 pounds. Assuming 50 per cent of passenger cars are sometimes used in maximum speed service, the average maximum weight imposed on the passenger car axle is 33,000 pounds and on the bearing it is 16,500 pound. For all practical purposes, the average passenger carload per 5½ by 10 bearing is the same as the 80 per cent loaded 5½ by 10 freight car bearing, since the passenger cars average 95 per cent of maximum permissible weight on axles (16,500 lb x .95 = 15,675 lb). Therefore, the load factor for a freight car roller bearing compared to a passenger car roller bearing is 1.0.

**"Speed Factor**—Average passenger train speed on 52 Class 1 railroads in the United States was 38.4 mph in 1954 and 38.9 mph in 1955 (Report M-200, Interstate Commerce Commission).

"Passenger car wheels are 36 in. in diameter and freight car wheels 33 in. in diameter. Since journal speed in rpm is the speed to be considered for capacity of roller bearings, the average passenger car speed has to be decreased 8.33 per cent to

compensate for wheel diameter. Therefore, the average passenger car speed for 1954 and 1955 is

$$\frac{38.4 + 38.9}{2} \times \frac{33}{36}, \text{ or } 35.4 \text{ mph for comparative purposes.}$$

"The average freight train speed was 18.7 mph in 1954 and 18.6 mph in 1955 (1955 Year Book—Eastern Railroad Presidents' Conference, page 45). These speeds include all stopped time, waiting time on sidings, time for switching, pick-up and set-out, which would increase these speeds at least 20 per cent, based on field test data available from several railroads. It is estimated that average freight train running speed today is

$$\frac{18.7 + 18.6}{2} \times 1.20, \text{ or } 22.4 \text{ mph.}$$

The Speed Factor then is

$$\frac{35.4}{22.4}, \text{ or } 1.58.$$

**"Mileage Factor**—Average journal revolutions per year is the function that affects bearing life, not car-miles. Passenger car-miles must be multiplied by

$$\frac{33}{36}, \text{ or } .9166,$$

to be equivalent to freight car-miles for the same number of journal revolutions.

"The national average passenger car annual mileage is 78,700 and the average freight car annual mileage is 16,200. The Mileage Factor then is

$$\frac{78,700}{16,200} \times .9166, \text{ or } 4.45.$$

**"Impact Factor**—The increased impact to which a freight car bearing is subjected over that imposed on the passenger car bearing is the most serious factor affecting bearing life. Coupling shock is the principal cause of brinnelling, surface cracking, flaking and shell-out of rollers on both inside and outside races. The small areas of contact between the rollers and the races are highly stressed in compression by this shock impact to the point that load bearing surfaces are deformed beyond their elastic limit. Cracks can be started which shorten the useful life of the bearing and cause failures in service.

"Despite the existence of standard instructions limiting freight car coupling impact speeds to 4 mph, from a practical standpoint these speeds are often exceeded. Coupling speeds of 6 mph in hump yards and classification yards are common and may be considered the average. Passenger cars, on the other hand, are coupled at maximum speeds of 2 mph, or at one-third the speed of freight cars. Since the energy of impact varies as the square of the speed, coupling shock then is at least 9 times more severe in freight service.

"Freight cars are also coupled at least eight times as often as passenger cars per year so overall coupling shock as a factor in bearing life is estimated as 72 times as severe.

It is therefore conservatively estimated that from the standpoint of impact the life of a roller bearing in freight service will be only one-fifth of the life of the same bearing in passenger service, giving an Impact Factor of .20.

**"Vibration - Thrust - Brake Loading**—Freight car wheel treads receive less maintenance than passenger car wheel treads, increasing damaging journal vibration and decreasing the life of freight car roller bearings. Freight cars travel over track on sidings, in freight yards, on spurs and on branch lines seldom



traveled by passenger cars. Such track is maintained at a lower standard where no passenger comfort is involved. This causes impacts and concentrated loads to be imposed on freight car bearings to which passenger car bearings are seldom subjected.

"Passenger car trucks are so designed as to impose much lower thrust loads on the bearing than in the case of freight car trucks where the side frame of the truck is restricted in its lateral movement by the bearing. Thrust loads on passenger car bearings are imposed by axle lateral forces only. Thrust loads on freight car bearings consist of the substantial increment imposed to help hold the truck side frames in place in addition to the axle lateral forces.

"Passenger cars have clasp brakes with opposing shoes on each side of the wheel that neutralize braking forces and do not increase bearing loads.

"Freight cars use a single shoe per wheel, exerting a pressure of 4,000 pounds against the wheel in a service application, so the bearing load is increased during braking by the amount that the resultant of vertical load and braking pressure exceeds the vertical load. This amounts to about 2%. During braking this increased bearing load decreases the

life to  $\frac{1}{1.02^3}$  or 0.94, a reduction of

6%. Considering all these factors, it is estimated that they will shorten the life of a roller bearing in freight service by 15%. This factor of .85 is used to compare life of the freight car roller bearing to the passenger car roller bearing as related to these conditions.

#### What It All Adds Up To

"The product of all the above factors is the Comparative Life Factor, or 1.196. This factor times the 25-year life of the passenger car roller bearing in passenger service is anticipated life of that bearing in freight service, or 29.90 years. Since its manufacturers agree that the low-capacity freight car bearing will have a service life only one-fifth that of the passenger car bearing, it follows that this new bearing will last only 5.98 years.

"If the low-capacity freight car roller bearing is to have a life expectancy of 6 years or less, as is indicated by thorough analysis, it would

TABLE II  
Annual costs per car

	Solid Bearings	Roller Bearings
Repairing hot box set-outs .....	\$ 9.05	\$ 0.59***
Damage to equipment—overheated journals broken .....	2.01	0.06***
Fires due to hot boxes .....	0.29	0.01***
Cut journals found due to routine inspection and periodical repacking .....	1.35	....
Defective bearings found during routine inspection other than wheel renewal and periodical repacking .....	2.69**	....
Periodical lubrication per AAR Rules 66 and 66-A .....	11.10	4.78
<i>Labor—not included above</i>		
Routine yard inspection and service .....	40.82	15.17
Cleaning and repacking journal boxes; wheel defect removals .....	0.20	....
Applying spring packing retainers .....	0.08	....
Nine year roller bearing inspection .....	....	2.53***
Replacing defective bearings .....	....	2.46
<i>Material—not included above</i>		
Defective bearing replacements .....	4.36**	47.05*
New axles (replacements) .....	3.35	4.13
Journal box oil or roller bearing grease and solvent .....	2.87	0.54
Prepared packing, journal box lids, spring packing retainers, bearing wedges, dust guards .....	3.20	....
GRAND TOTALS .....	\$81.37	\$77.32
ANNUAL DIFFERENCE PER CAR THROUGH USE OF ROLLER BEARINGS: .....		\$ 4.05

\* Roller bearing cost calculated thus:  
Timken figure for bearing, 25 year life .....

Six-year life correction factor (25 ÷ 6) .....

Annual roller bearing replacement cost .....

\*\* AAR figures corrected for 4,500,000 bearings per year.

\*\*\* AAR figures—subject to adjustment upward to reflect 6-year roller bearing life rather than 25-year roller bearing life.

naturally affect hot box costs, damage to equipment costs, inspection costs, etc. But the major item affected would be the annual bearing replacement cost which would soar from \$11.29 per car (Timken report) to \$47.05 per car. Using this figure, together with other roller bearing costs developed in the AAR study, and comparing overall roller bearing costs so determined with AAR solid bearing costs, a difference in annual costs of only \$4.05 per car would result. In accordance with the AAR formula for calculating break-even points, this would permit an investment of only \$346.02 per car for roller bearings.

#### What of the Future?

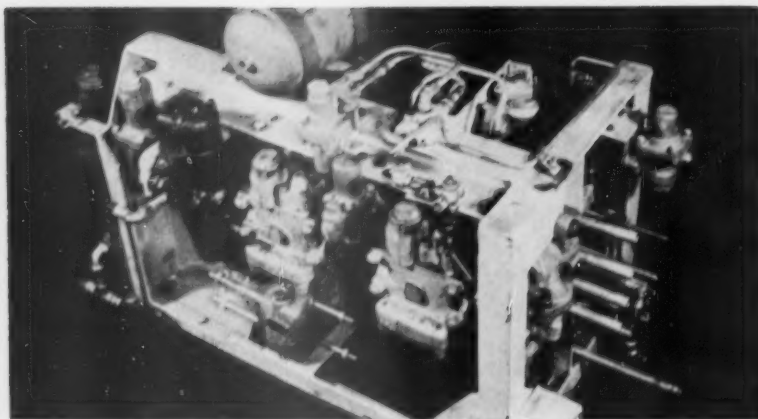
"From a practical as well as an economic standpoint, in order to obtain better bearing performance," says the Advisory Committee, "the

railroads should continue to pursue their present course of intensified development of existing bearing assemblies.

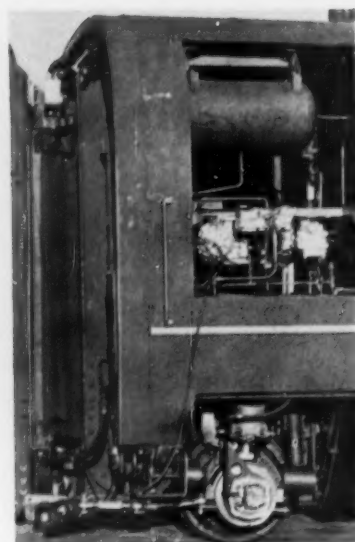
"Improved solid bearing assemblies, equipped with pad-type lubricators and the means for preventing excessive axle displacement during impacts, have already proved themselves both in the laboratory and on the road. These developments may soon be mandatory on all new equipment.

"Sufficient information is already available to permit estimates of overall operating costs when this transpires. Conservatively, based on reports published by the railroads, the incidence of car set-outs can be reduced to one-fourth the frequency experienced in 1954. This will result in corresponding reductions in damage to equipment and fires from that

(Continued on page 70)



LWE equipment, including locomotive brake rack (above), has been used on three Baldwin diesel-hydraulic locomotives, and on two trains of Pullman-Standard Train-X coaches (right) now in operation.



## For Lightweight Trains . . .

# The LWE Brake Equipment

The LWE Brake Equipment is simple lightweight air brake equipment developed by the New York Air Brake Company. It is a dual brake system providing (1) an electro-pneumatic straight-air brake system for basic control; and (2) a full automatic brake system for conductor's valve application, for brake valve actuation in event of straight air brake failure, for train stop functions and for break-in-two protection. It is a simplified version of New York's DCE brake equipment used on the original articulated Union Pacific's "Streamliners".

Design of conventional air brake operating devices has been followed. Wherever possible, brake portions are mounted on pipe brackets. Components have been designed to occupy a minimum of space, and all new portions are built with aluminum bodies for minimum weight. The LWE equipment is designed only for unit-type trains in segregated service, and cannot itself be operated as an automatic brake when coupled to conventional equipment. Towing control can be installed on the locomotive of a unit-type train or on individual cars, and through this control the LWE equipment can be made to function with standard b.p. applications.

LWE-equipped trains have no

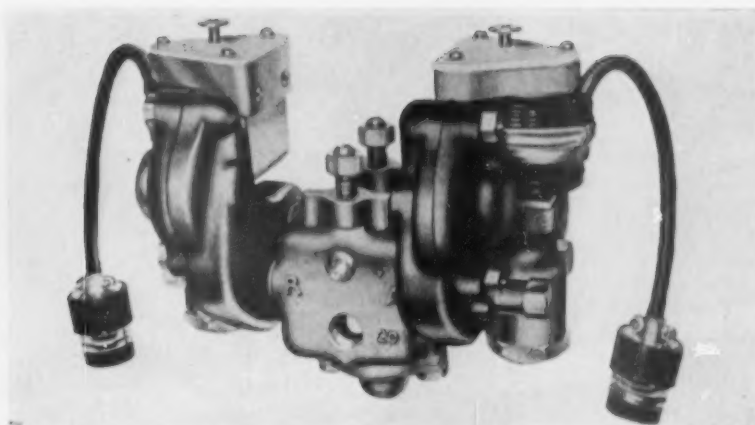
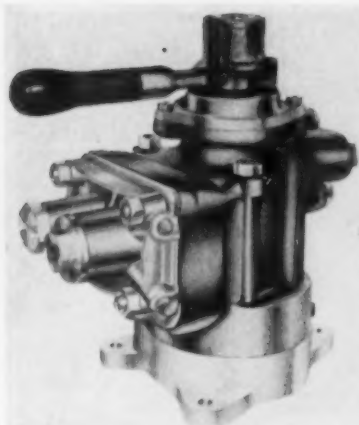
brake pipe through which the conventional automatic brake operation can be accomplished. Instead, the locomotives and cars have two other pipes which run through the length of the train—a 1-1/8-in. OD supervisory line and a 5/8-in. OD straight air pipe. There are also three trainlined electric brake conductors—the application, release and common (negative) wires.

The electro-pneumatic straight air brake system is built around the straight air pipe which functions to equalize the pressure developed simultaneously on all cars. The major components are the LWL Self-lapping Brake Valve, and its control pipe to a Master Relay Valve and Circuit Breaker which is on the propulsion unit. The contacts opened or closed by brake valve operation energize the trainlined d-c control wires to actuate each Application and Release Valve (one is located on each propulsion unit and car). When the Application and Release Valve's magnet valves operate, they function to admit a local supply of air to, or to exhaust air from, the brake cylinders throughout the train. This type of system produces rapid, flexible operation.

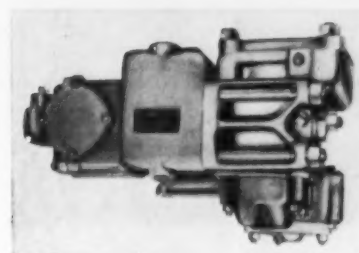
In event of electric system failure and magnet valves throughout the train cannot produce the straight-air

application and release, the pneumatic relay portion of the Master Relay Valve and Circuit Breaker on the propulsion unit is actuated by the pressure differential created between the control pipe and the straight air pipe. This automatically and promptly admits air or exhausts it from the trainlined straight air pipe at the propulsion unit to accomplish the straight air functions. While subject to a pneumatic lag caused by feeding or exhausting the straight air pipe from one end only, essentially the same applications will be achieved as with the electrical system.

The full automatic brake system is built around the trainlined supervisory pipe which is used during electro-pneumatic straight-air brake operations to supply air to the car supply reservoirs and keep them constantly charged. Full automatic brake operation is initiated by depleting this supervisory line and can be caused by (1) operating conductors valve, (2) train control penalty application, (3) train breaking in two, and (4) moving the LWL Brake Valve to its extreme right hand position which causes air to vent to atmosphere through a large capacity valve. This supervisory line also functions in a manner similar to an equalizing pipe between the propul-



Cab brake valve (left above) and Master Relay Valve and Breaker (left below) are vital parts of locomotive equipment; important on coaches is Electro-Pneumatic Application and Release Valve (above).



sion units on opposite ends of a train when they are so used. In event of a failure of the compressor on the leading unit, the compressor on the trailing unit can furnish air to the supervisory line through the suspension valve. This will keep all reservoirs charged including the main reservoirs on the lead unit, and all normal functions of the lead unit brake controls are operative. The supervisory line also charges the air spring suspension on cars so equipped.

Towing brake control consists of a plain triple valve and its auxiliary reservoir. The brake pipe of the towing locomotive is connected to the supervisory line extension through a standard air hose. This supplies all the reservoirs on the LWE-equipped rolling stock. Brake pipe reductions on the towing locomotive actuate the towing control triple valve on the propulsion unit being towed. This supplies auxiliary reservoir air to the control pipe to initiate brake applications throughout the train via the electro-pneumatic straight air pipe system. If electric supply is not available, brakes respond pneumatically.

The LWL Brake Valve is of the self-lapping type and has a poppet valve for venting the supervisory line

pressure when its operating handle is in the *Automatic Full Application* (extreme right) position. Also there is a small rotary valve for controlling initial supervisory line charging, for the No. 8 Pipe function, and for supplying feed valve air to the No. 25 pipe in *Automatic Full Application* position. The zone between *Release* and *Full Self-Lapping* positions is for service applications of the straight air brake system.

The Master Relay Valve and Circuit Breaker gives either an electro-pneumatic or purely pneumatic control of the flow of air to or from the straight air pipe in response to the brake valve control pipe. The duplex circuit breaker portion and master relay valve portion are mounted on the same pipe bracket. The circuit breaker portion functions to energize or de-energize the trainlined electric circuits. The master relay valve portion parallels pneumatically the functions of the duplex circuit breaker in case electric circuits should fail; also keeps the straight air pipe open to atmosphere whenever the brake is released.

The locomotive has an F-6-MD feed valve which reduces main reservoir air to 110 psi for brake components. Other locomotive equipment includes a By-Pass Charging Valve which supplies main reservoir air directly to the supervisory line so long as main reservoir pressure is below 90 psi during initial charging of the equipment. A Suspension Valve is provided to terminate supervisory line charging during a full automatic brake application. There is an SA-5 straight air brake valve for independent locomotive brake opera-

tion. The system has additional standard parts usually associated with locomotive brakes.

The Electro-Pneumatic Application and Release Valve on the locomotive and each of the cars is comprised of application and release magnets and their relay valves which responds to supply or exhaust the straight air pipe and operate the brakes. Also associated with this equipment is a Service Valve which is reported to connect the straight air pipe to the relay valve control pipe as long as the supervisory line pressure is approximately 70 psi or more. Upon depletion of supervisory line pressure, the Service Valve connects the propulsion units main reservoirs, or the cars' supply reservoirs, to the relay valve control pipe. The Limiting Valve in the relay valve control pipe limits the brake cylinder pressure during a supervisory-line-actuated pneumatic brake application.

On Pullman-Standard's Train-X and Budd's Pioneer III, arrangements have been made in the LWE equipment to regulate brake cylinder pressures in response to special requirements necessitated by the designs of these units. The LWE equipment is designed so that brake cylinder build-up times and maximum pressures can be varied to suit the particular needs of any new train designs. The electro-pneumatic brake feature of applying brakes rapidly and simultaneously on each car and of releasing promptly and uniformly, along with the pneumatic straight air brake system which takes over in case of electric failure, provides an adaptable brake specifically designed for segregated service.



## Canadians Test German Diesel-Hydraulic

*MaK road-switcher has 800-hp in-line diesel, Voith transmission, and side rod drive*

Both the Canadian National and Canadian Pacific have been testing an 800-hp, German-built, diesel-hydraulic road switcher. This MaK Type 800-D, rigid-frame, eight-wheeler first went into service on Canadian National runs out of Montreal during May. In way-freight and combination way-freight and switching service it accumulated 1,550 miles. During June it made twenty round trips on a CNR local passenger train operating between New Glasgow, Pictou and Oxford Junction, Nova Scotia. Here it handled two or three coaches; made 188 miles each trip; and ran a total of 3,666 miles that month. At the conclusion of this test a CNR representative could report that it "performed very satisfactorily," and "fuel consumption, in so far as it could be checked, appeared to be

comparable to a diesel electric unit in similar service."

The unit then moved to the Canadian Pacific. It operated on the Ontario and Quebec lines of the CPR through the months of July and August. It did a variety of jobs—handling switching, transfer, branch-line freight and branch-line passenger assignments. The Canadian Pacific could then say that the unit "performs very much like a diesel-electric and it cannot be said that it has any distinct operating advantages over conventional diesel electric power."

At the conclusion of the CPR tests the unit went to the Canada Machinery Company, Galt, Ontario, where the locomotive has been modified to better fit it for low-temperature winter operation. It is now going to operate on Canadian National lines in

Northern Ontario during the winter months.

This unit was built in Kiel, West Germany, by Maschinebau Kiel Aktiengesellschaft (MaK). It is powered by a MaK eight-cylinder diesel. This power is delivered to the four driving axles through a Voith L-37z hydraulic transmission. The 49-in., steel-tired drivers are turned by side rods from cranks on a jack shaft extending out from the reducing and reversing gearbox which is directly attached to the Voith transmission housing. Crankpins are arranged at 90-deg with respect to each other on the two sides of the locomotive.

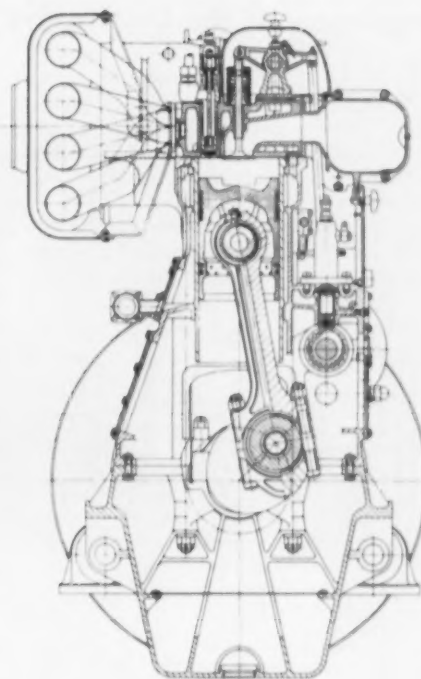
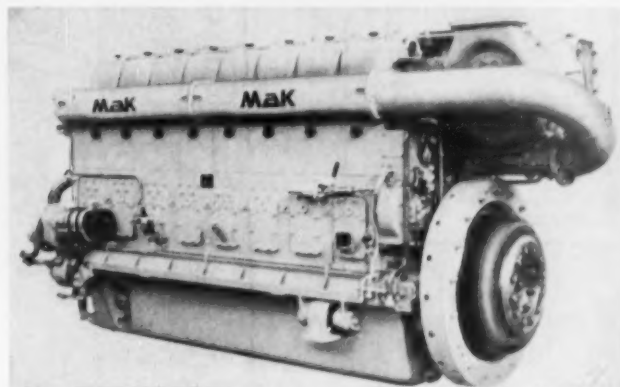
The underframe is a welded assembly of plates and rolled sections. This frame has the pedestal openings for the four axles, and provides the mounting base for the diesel pow-



## The MaK Engine . . .

Supercharged MaK diesel engine is one of series produced by this Kiel builder. It operates at 750 rpm. German State Railways have program requiring builders to produce diesels with standard mounting arrangement and mounting dimensions, and with the same general overall dimensions. This permits application of various types of engines to the railway-designed, standard German motive power units.

CNR and CPR tests do not mark first appearance of this engine and locomotive in the Western Hemisphere. Consolidated of Cuba has operated a fleet of these road switchers for some time.



er plant, transmission and carbody. The two axles at each end of the unit are equalized, but there is no equalization between these two pairs. The two axles at each end are also connected through Baldwin-Beugnot levers which are designed to prevent all the guiding forces being exerted through the leading flanges and distribute them through all the axles.

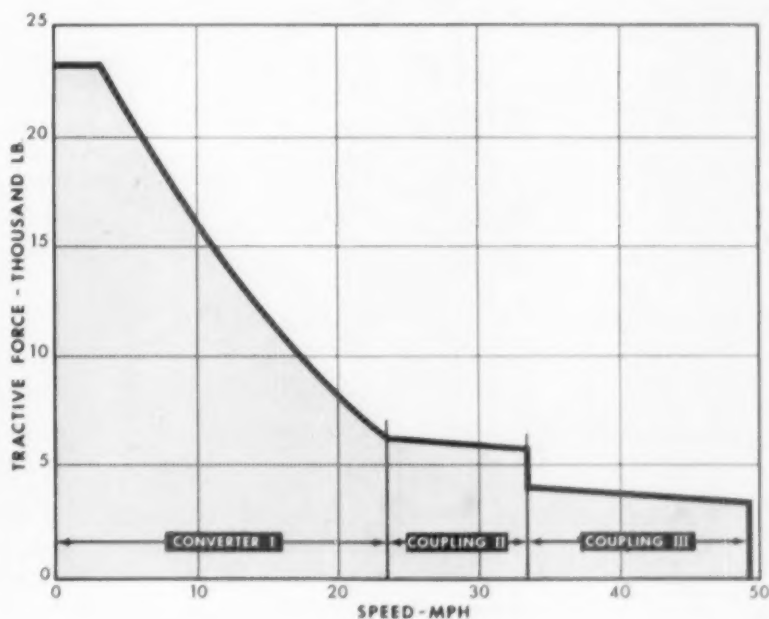
These Beugnot levers are longitudinal central beams between two axles. Each beam is pivoted to the underframe at its center and connected at the outer ends to the centers of tubes which join the driving-axle boxes. Transverse displacement of one axle set in one direction means that the coupled set must move in the opposite direction. Lateral clearance is provided on the crank pins of each driving wheel to permit the lateral motion of the wheel set. The side rod connection at the jack shaft is fixed (no lateral) and it has been found that this does not cause excessive rod bushing wear. MaK uses this Beugnot system on 600 and 800-hp units, but resorts to trucks and Cardan shafts for higher-powered, longer locomotives.

Side rods are articulated and can follow the motion of the driving wheels under the laminated leaf springs in the equalizing system. The

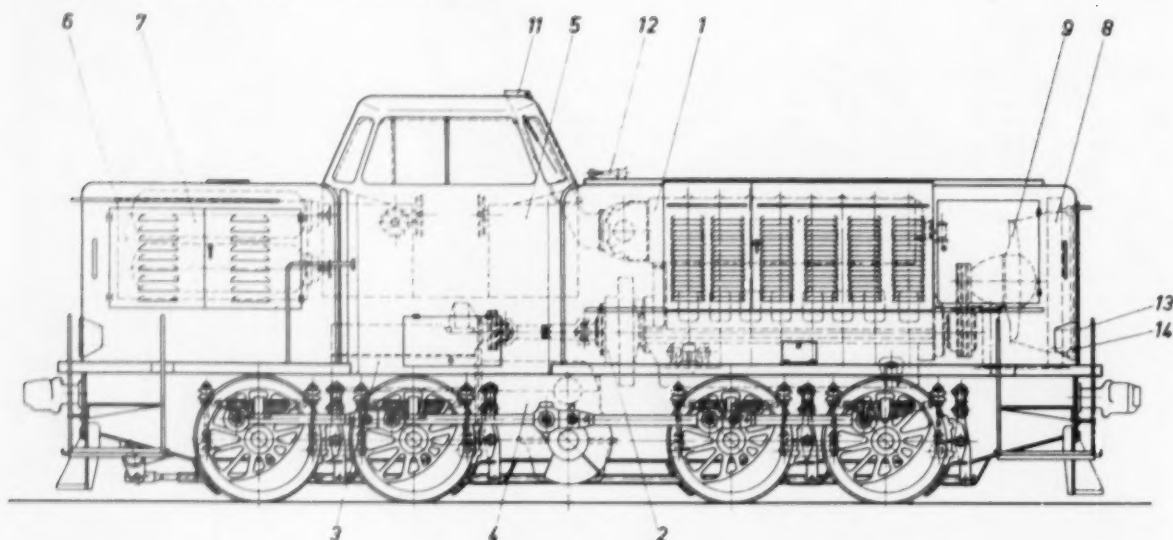
spring hangers and brackets are arranged to permit the lateral motion of the Beugnot arrangement. Plain bearings are used in both the side rods and driving boxes.

The engine is an eight-cylinder, in-line, four-stroke cycle, supercharged diesel operating at a maxi-

mum 750 rpm. Cylinders ave a 9.1-in. bore and 11.8-in. stroke. The sleeve-type liners are water cooled. Inside the crankcase is the camshaft which is gear-driven from the crankshaft. It actuates a Bosch injection pump at each cylinder, and through push rods and rocker arms, the inlet



## Components of the Locomotive . . .



- 1 Diesel-Engine
- 2 Periflex Coupling
- 3 Voith Transmission
- 4 MaK Reducing and Reversing Gear
- 5 Engineman's Controls

- 6 Fuel Tank
- 7 Air Reservoirs
- 8 Radiator
- 9 Fan

- 11 Exhaust
- 12 Horn
- 13 Tail Light
- 14 Head Light

valve and exhaust valve in each cylinder head. In addition to these valves, each head also has the injection nozzle, an indicator valve, and a valve for introduction of starting air.

The crankshaft is a one-piece forging, hollow drilled to supply oil from the main bearings to the crankpin bearings and wrist pin bearings. The hollow-drilled connecting rods carry light weight pistons with deep, trough-shaped crowns. Each piston has four compression and three oil rings.

The engine is started with 425-psi compressed air from two reservoirs in the short hood back of the cab. The engine has a torsional balancer inside the V-belt pulley at the front end. The pulley is used to drive the fan which cools the engine water, engine lubricating oil, and Voith transmission oil.

A Periflex coupling and universal shaft are used to connect the engine to the hydraulic transmission. The coupling incorporates a rubber collar which is attached to the engine flywheel at its outer edge, and is fixed to the shaft around its inner circumference.

The Voith transmission consists of one torque converter used in the first speed range, and two fluid couplings used successively in the second and third ranges. Speed change is fully automatic. In this transmission the converter and coupling are engaged and disengaged by filling and emptying them as required by the control system. There are no clutches or gear changes over the locomotive speed range. Power is entirely transmitted by the kinetic energy of the fluid so that there is no physical contact between machine parts. From 1932

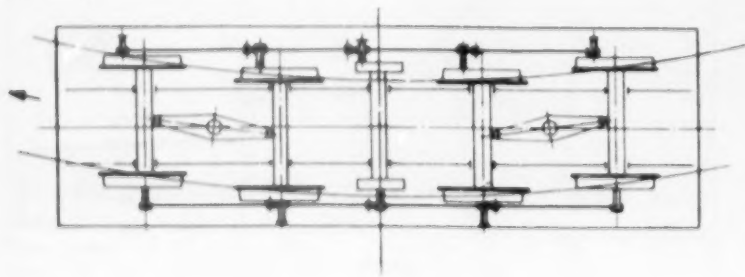
through 1955 more than 5,000 Voith transmissions of various types are said to have been sold for railcar and locomotive service, with single transmissions used at ratings up to 1,400 hp.

The MaK locomotive has a reducing and reversing gear box containing the spur reduction gears, bevel reversing gears, and claw clutches all

Operator's controls on this sixty-ton locomotive are not complicated.



Beugnot lever system has been designed to give truck-like flexibility to lighter MaK locomotives.



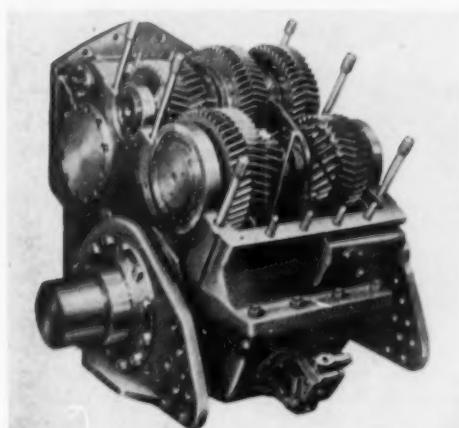
carried in roller bearings with gears constantly meshed. The reversing gear is protected so that it can be operated only with the locomotive at a standstill. For towing, the jaw clutches in the reversing gear are brought to a neutral position and locked.

Rubber pads under the cab, and leather bellows connections to the front and rear hoods are intended to eliminate vibration. The cab is double

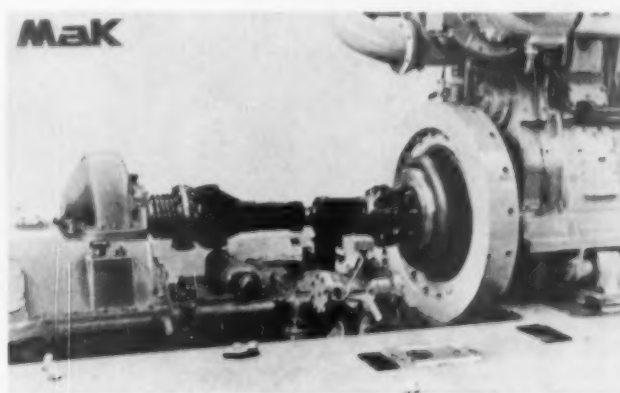
walled and insulated for thermal and acoustic purposes. The 400-gal fuel tank is located in the hood at the rear of the cab. Belt driven from the crankshaft is a 264 cfm MaK air compressor. A 700-w, 24-v d-c generator is mounted on the engine and supplies power for locomotive lighting and for charging a 150-amp-hr lead-acid battery. The locomotive is designed for pneumatic multiple-unit operation.

For service in Canada, this locomotive has been equipped with foot boards, AAR couplers, head lights and marker lights. Its future and its potential are still being decided. Both CNR and CPR are seeking locomotives which have lower first costs than diesel electrics. Another unproved field could be lower maintenance expense. Neither road has yet decided whether the diesel hydraulic locomotive has a place in its operation.

## Power To The Wheels . . .



Reduction and reversing gear box with jack shaft.



Voith transmission (left) is connected to the diesel engine with universal shaft and Periflex coupling. Transmission is mounted over the MaK gear box.



Articulated side rod drive is designed to accommodate the flexible arrangement built about the Beugnot lever system.



## All-Welded Aluminum Bodies Cut Gondola Weight

The all-welded aluminum alloy body on 35 gondola cars built by Magor has reduced the light weight some 25,000 lb over conventional gondolas of the same nominal capacity. The reduction in weight permits the cars to carry 20 per cent more

loading than existing steel cars on the same trucks.

While these cars were built for a subsidiary of Kaiser Aluminum to haul bauxite on Jamaica, U. S. standards are followed except for a novel air brake system. Instead of operat-

ing at full pressure at all times, a valve in the locomotive reduces train line pressure when hauling empties. Thus, the wide fluctuation between empty and loaded weights will not slide the wheels when empty or cause the cars to be underbraked when loaded.

The two pressures used are 90 psi, which gives a loaded braking ratio of 70%, and 50 psi, which gives a 25% ratio on empty cars. Empty steel cars in the consist have a 22% ratio with the 50-lb setting. If it is necessary to move an empty aluminum car in a loaded train with the 90-psi setting, the brakes are cut out on the car.

The car bodies are built with a relatively new aluminum alloy selected because it is easy to weld, has

**Principal Dimensions and Capacities of  
Aluminum Gondola Cars**

Length, coupled, ft-in	40-9
Length, inside, ft-in	36-5
Width, inside, ft-in	9-6½
Height, inside, ft-in	6-6
Capacity, level, cu-ft	2,233
Capacity, heaped, cu-ft	2,630
Capacity, lb.	173,300
Weight, empty, lb.	36,700



high strength and good ductility after welding, and possesses good resistance to corrosion. The alloy, designated 5086 in the standard aluminum alloy classification system, derives its physical properties by alloying and work hardening rather than by heat treatment. Its design stress is some 30 per cent higher than the commonly used 6061 group when both are in the "as welded" state (i.e. not heat treated and aged after welding).

The all-aluminum body is attached to a standard AAR steel underframe with hot driven rivets which pass through the side sill angle, floor plate and diaphragm. Contact areas, where steel and aluminum meet structurally, are insulated by zinc chromate paint on the aluminum and a coat of red lead on the steel. The entire underframe is also sprayed with a cement.

As these cars are unloaded in rotary dumpers, the sides are of necessity designed to withstand the weight of the entire lading while dumping. Two  $\frac{3}{4}$ -in. aluminum plates are butt-welded together to form a continuous side. Each side is reinforced by a top side rail which is made of a single extruded section as are side posts, which fit into the top side rail and are welded to the exterior of the side sheets on 3-ft centers.

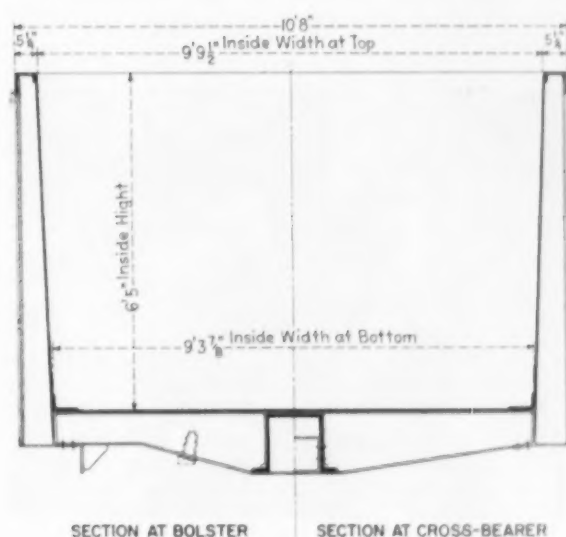
The web of this T-shaped side post is taper-cut from a 12-in extruded I-beam, and the flange is reinforced with a  $\frac{7}{8}$ -in. by 4 in. reinforcing plate, serving to make the outside



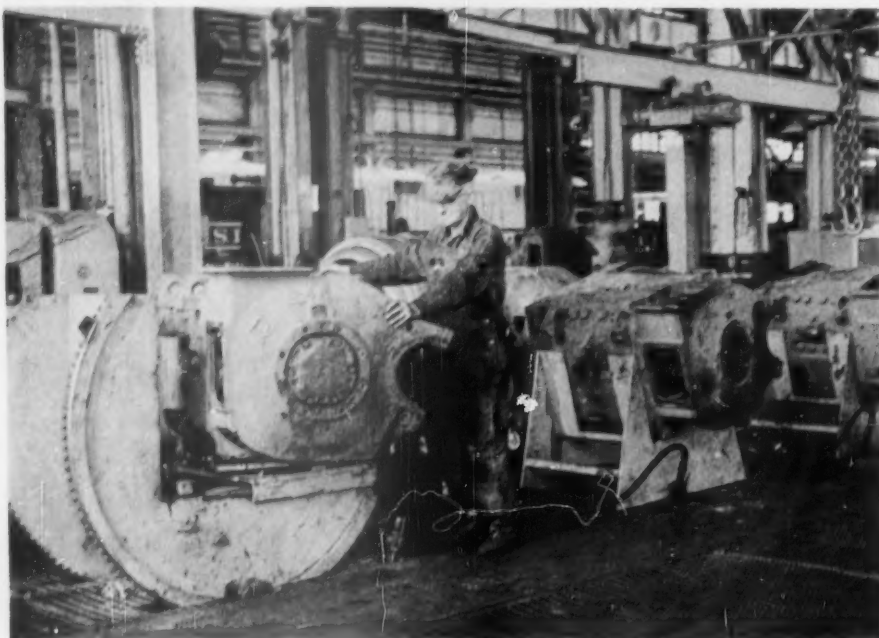
In this view workmen are shown persuading the car into position with crow bars preparatory to welding the car ends into place.

of the post flush with the top side rail and to produce the stiffness required for various unloading positions when the car is in the rotary dumper. Gussets welded to the bottom of each post stiffen the section at floor level. The side sheets themselves are sloped outward at a 2-deg angle to facilitate gravity dumping.

The car body is strengthened by an extruded aluminum side and end sill angle 6 x 4-in. welded to the side, end and floor. The end of the car has three extruded channel-shaped vertical posts welded to the outside of the end sheet, and two horizontal aluminum straps welded to the end posts and corners.



The aluminum body is hot riveted to the standard steel underframe and contact areas are zinc chromate painted.



A day's work is set up on the three motor stands.

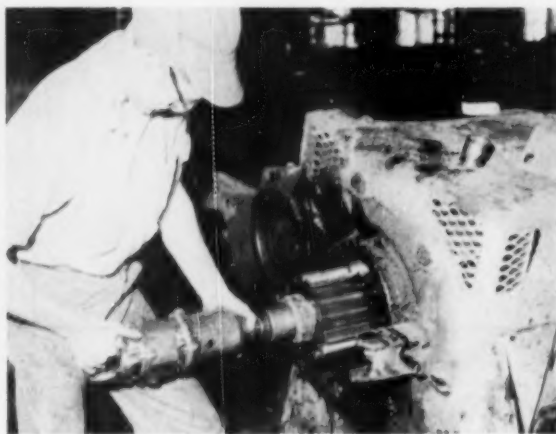
## Production Line Motor Stripping

THREE MOTORS are stripped and cleaned in the same time formerly required by two in the Silvis, Ill. shops of the Rock Island. This has been accomplished primarily by applying one turntable to a motor upender and another to an armature stripping stand. The procedure has also been streamlined so that work is less

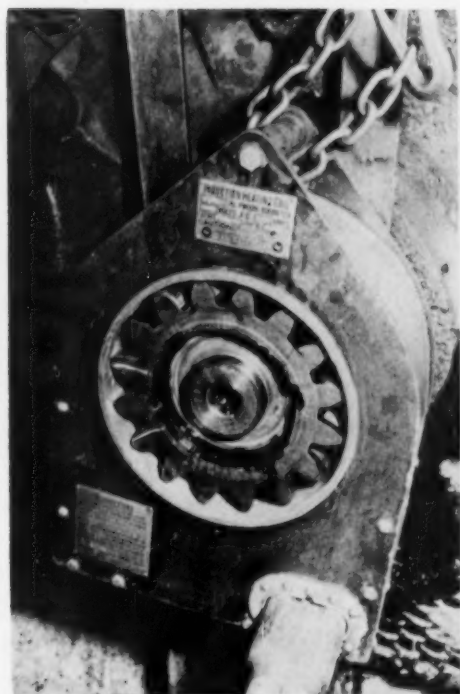
**Rock Island increases stripping of traction motors 50 per cent by using turntables on upender and on armature stripping stand**



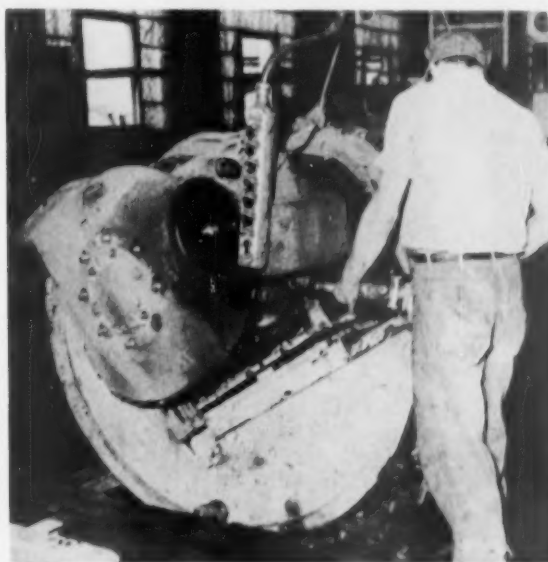
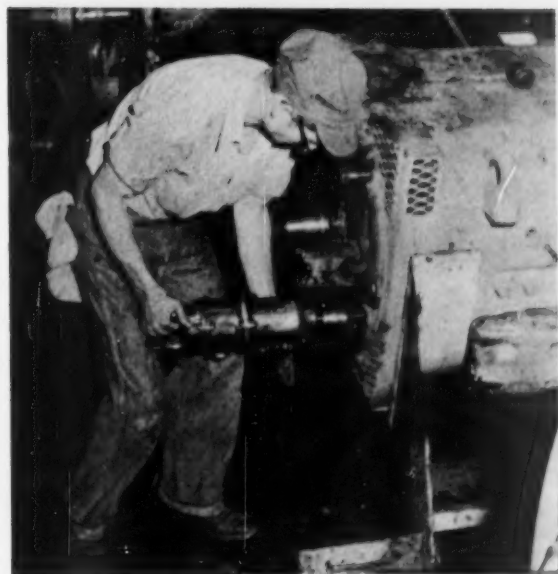
Bedplate of the turntable on the upender motor stand.



An impact wrench is used to remove the pinion nut.



At left: The pinion heater in place with wedges behind the pinion.  
Lower left: Cap screws holding the pinion end housing yield to the impact wrench.  
Above: The pinion end bearing cap is also removed with the impact wrench.  
Below: The upender puts the cap screws where they are easy to reach.



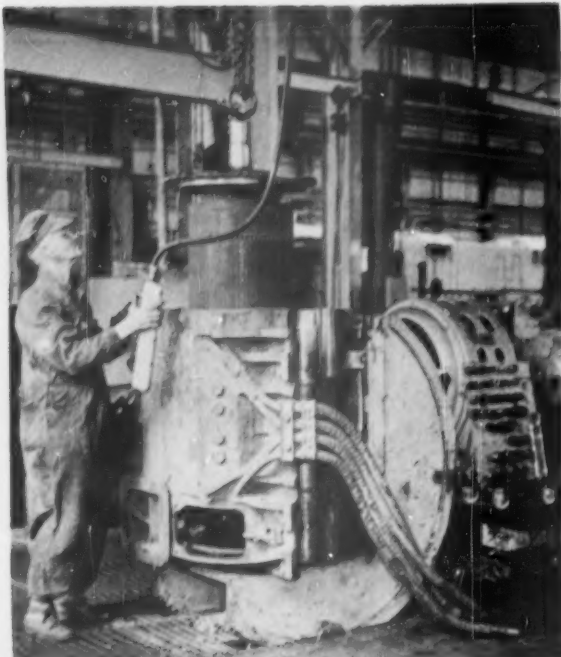
arduous and the quality of workmanship is considerably improved.

The stripping is done with two fixed stripping stands and a third stripping stand which incorporates an upender which is equipped with a turntable. Other equipment used includes two induction heaters for removing pinions, impact wrenches, an overhead crane for handling frames and armatures, two jib cranes for holding parts, one degreaser, one soft blast booth with one sawdust and one corncob tank, one small bearing press, a hydraulic ram with a motor-driven pump and an armature stripping stand equipped with a turntable.

With this equipment, two mechanics and a helper in-

spect, dismantle, degrease and clean three complete traction motors each day.

The procedure consists of moving in three motors, selected if possible to be the same type, and placing them on the three stripping stands. The first operation consists of removing all covers, axle caps and pinion nuts on all three motors. A report is then made out for each motor showing type, serial number and pertinent data including miles of service and condition of the motor. The report is sent to the office and while the data is being prepared, the three pinions are removed with an induction heater. Temp Sticks are used on the pinion to indicate 330 and 400 deg F. Wedges behind the pinion are tightened before heat is applied and again when the temperature reaches 330. The time of removal is  $\frac{1}{2}$  to  $\frac{3}{4}$  minute.

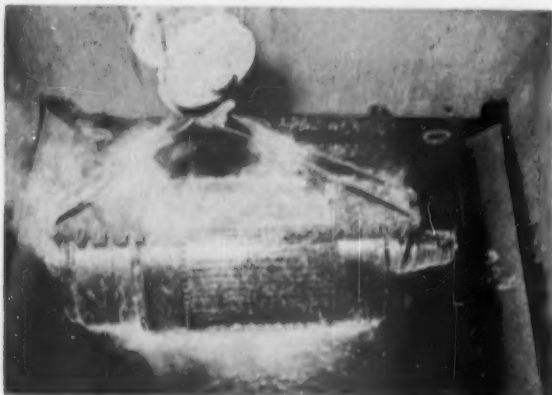
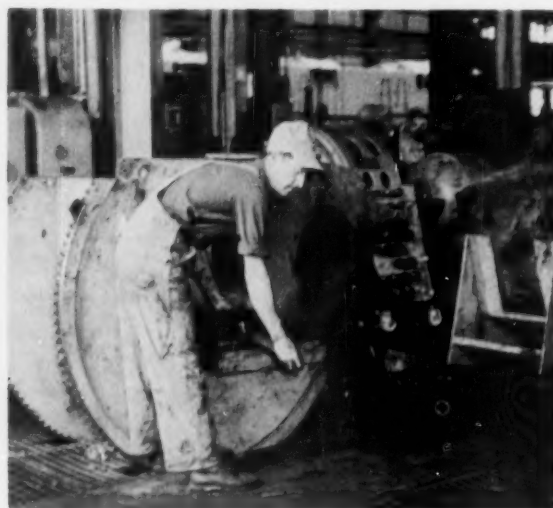


At left: The armature comes out of a frame.

Above: All six motor support bearing caps for the three motors go into the degreaser on a special chain sling.

Lower left: Heavy dirt is not washed off in the degreaser, but is taken off afterward with a saw dust blast for metal parts and cob blast for insulation.

Lower right: By turning the motor on the table, brush rigging becomes easily accessible.



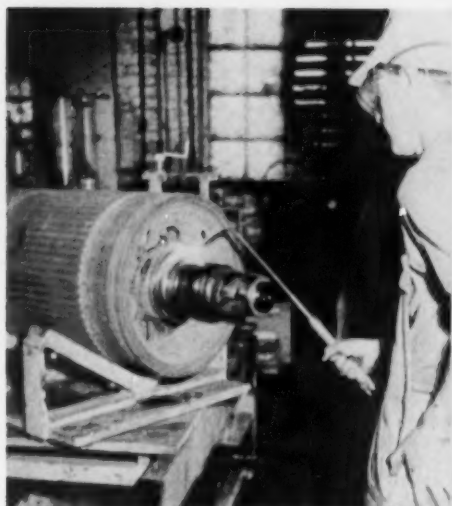
An armature goes into the degreaser horizontally, supported on steel cables, held away from ends of armature by wooden spreader.

Motor insulation is measured with a Megger tester. If the resistance is more than 100 megohms, the motor is given a high potential test at 1050 volts for one minute. The reason for having two pinion heaters is to avoid running the temperature of the heaters too high.

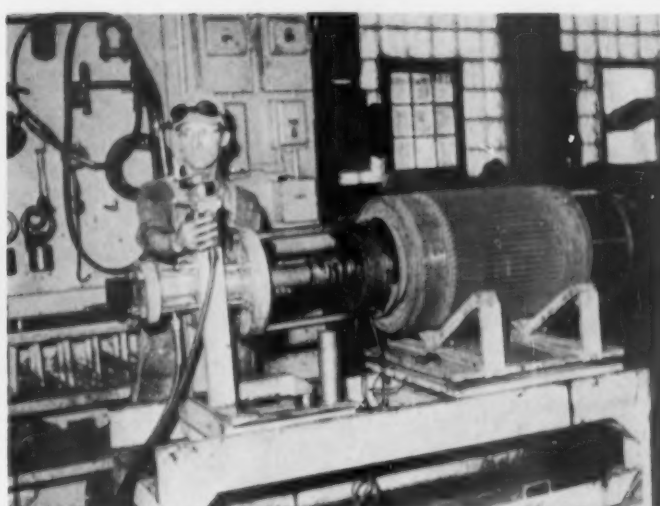
After receiving the hi-pot test, the motors are run light at 1,400 to 1,800 rpm. They are checked for noise in bearings, condition of commutator and balance of motor. The reports are returned from the office and this data is added.

The three armatures are then jacked out and the motor on the No. 1 stand is tipped up and the armature lifted out and placed on the armature stripping stand. The frame on the No. 1 stand is then tipped back to the horizontal position, rotated 90 deg by means of the turntable and the brush rigging removed. This means





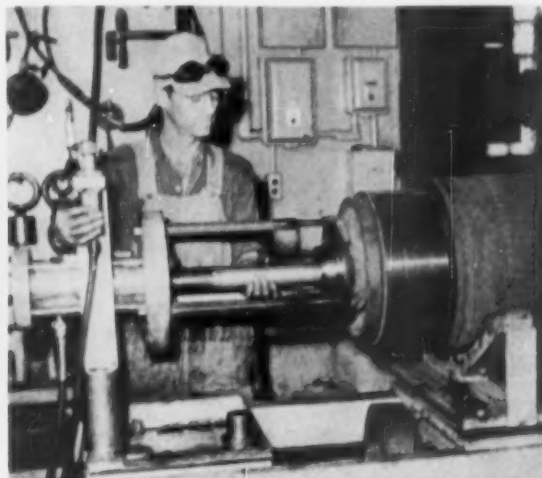
The outer oil ring on the pinion end of the armature is removed on the armature stand by heating it with



an acetylene torch. After heating, the operator watches the pressure gage as he pulls the inner race of the pinion end bearing.



Induction heating coil used to expand the inner race of the pinion and bearing. At right: With the table turned 180 deg, the ram is used to pull the inner race of the commutator end bearing.



Both the turntable and the ram stand may be moved horizontally along the bed of the armature stripping stand.

of rotating the frame and placing it in any desired position, materially reduces time and labor required. The frame on the No. 1 stand is then moved to the degreaser and the motor on the No. 2 stand is moved to No. 1, and stripped in the same manner as the first motor. The third motor follows in the same order, completing this part of the daily work program.

On the armature stripping stand, the head bolts are removed with impact wrenches. The outer oil ring is removed by applying heat with an acetylene torch. The bearing and bearing housing is slipped off the inner race. The inner race of the pinion-end bearing is then pulled with the aid of the hydraulic ram and an induction heater.

The armature is then rotated 180 deg on the turntable. This permits the operator to remove the outer bearing cover on the commutator end, remove the retaining nut or bolt, and slip the commutator end bearing housing

and outer race off the inner race. The housing and race are placed at one side of the bearing press.

The armature is then again rotated 180 deg on the turntable and placed in position to pull the inner race of the commutator end bearing. No heat is necessary for this operation.

After the inner race is removed, the armature is again rotated 90 deg. and the pinion end inner grease seal is removed from the shaft to facilitate Magnafluxing.

The armature is picked up in a horizontal position by means of a wooden spreader and steel cables. The spreader is adaptable to various size armatures, and lowers the armature in a horizontal position into the degreaser.

Bearings are removed from their respective housings by means of the bearing press and are boxed and sent to the manufacturer for inspection and reconditioning.

All other parts removed are degreased and cleaned, moved to an inspection point and routed through the

shop. The armature, the frame and bearing parts in baskets are put through the degreaser and soft blast.

The dirt binder, but not the bulk of the dirt is removed in the degreaser. Parts are not washed with a stream of the degreasing liquid and the heavy dirt is removed with the blast. The cob blast is used on insulation and the sawdust on all metal parts. This relieves the degreaser of contamination and it is only necessary to clean it once in 3 weeks or once for 45 motors.

The time that armatures are allowed to remain in the degreaser is limited to 5 minutes and the time for frames is 7 minutes. The solvent used is trichlorethylene. The temperature of the solution is 246 deg F when fresh and 286 when the contamination reaches 70 per cent.

The turntable on the upender rests on a central thrust bearing. It consists of a 26-in. square plate. There are four roller side bearings which keep the plate from tipping, and four bearings which permit the plate to roll longitudinally within rubber stops. The center stub shaft

protrudes through the rotating table and has a retaining collar threaded on the shaft to keep the table from lifting off the upender. The motor frame is positioned on the table by four V-shaped bars to hold it in the center on the bearing. Motors do not need to be secured to the turntable.

No machining was required to make the table and upender. All work was done on a drill press. The gears were cut on an Oxygraph.

The upender has limit switches and mechanical safety stops. A load brake holds it in any position. The motor is a  $\frac{3}{4}$ -hp., 3-phase motor.

The armature work stand and turntable was built on the same principle. Both the hydraulic ram table and the armature turntable can be rolled horizontally along the top of the stand. The ram is set on jack screws so that it can be moved up and down to match the height of the armature shaft. The head on the ram is drilled for various types of motors.

## From the Diesel Maintainer's Note Book

### *Horse Sense Gets Horsepower*

By Gordon Taylor

Webster defines horse sense as practical common sense. I have long felt that in diesel-electric operation horse sense is just as important as horsepower. Many of our everyday failures are caused by careless actions or failure to use horse sense. Many cases of trouble can be solved by application of horse sense if our maintainers are familiar with the causes of failures, and apply simple remedies.

A GP-7 unit was the first trailing unit in a four-unit combination. It was to be cut out of the combination and dispatched as a single-unit locomotive at a certain point on the line. About the time it arrived at the terminal where it was to be set out, it dropped its load and the crew could not get it to pick up the load.

A phone call to the nearest division point resulted in the master mechanic and electrician driving to the scene of trouble. The electrician, knowing his diesel, quickly noted that the load regulator was staying in minimum field position and suspected that the *O* valve plunger was stuck. In checking this, he found that the *O* valve was energized, which is the natural condition when the *BF* contactor is standing open.

To get the *BF* contactor energized seemed to be the problem; for with it energized, its *CD* interlock would open and de-energize the *O* valve, which would allow the load regulator to get away from the minimum field.

The next question was: What is interfering with the *BF* contactor to prevent its picking up? The *BF* contactor is energized by the closing of the *LRC* contactor. The *LRC* is located in the electrical control cabinet in the cab.

Why was the *LRC* not being energized? The *LRC* is normally energized by the *CD* interlock on the *LRS* switch. The location of *LRS* (load regulator shunting switch) is at the load regulator.



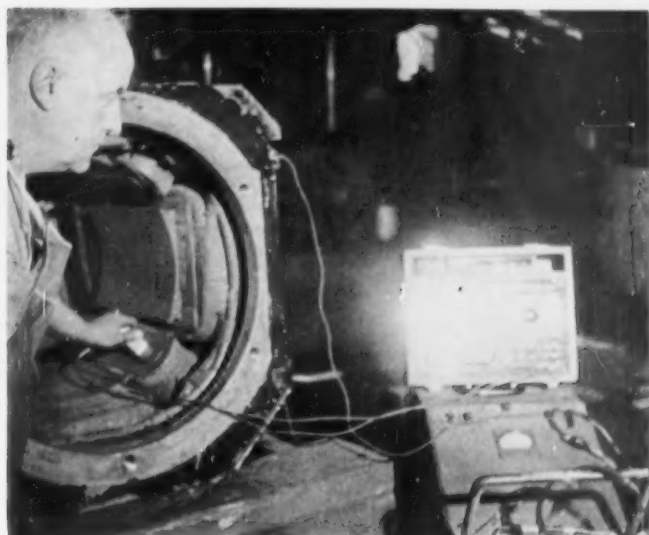
Checking the *LRS* revealed that the *CD* interlock was burned and dirty. Failure to make contact at this point prevented *LRC* from picking up.

When the *CD* interlock on *LRS* was operated a time or two by hand and cleaned, the following events occurred: The *LRS* caused the *LRC* to pick up.

When the *LRC* closed, its interlock *GH* energized the *BF* contactor.

When the *BF* contactor was energized, it opened its *CD* interlock, which de-energized the *O* valve.

When this occurred, the load regulator moved away from minimum field, and the main generator got excited enough to get the diesel horses back on the job. Horse sense is just as important as horsepower to keep the diesel running on time.



The output of the oscillator is connected from coil terminal to ground and the exploring coil terminals to the meter when a ground is to be located. At right: The generator is on wheels for moving to the job. The loudspeaker may be seen in the left side. The milliammeter records the output of the exploring coil.



## H-F Electronic Fault Finder

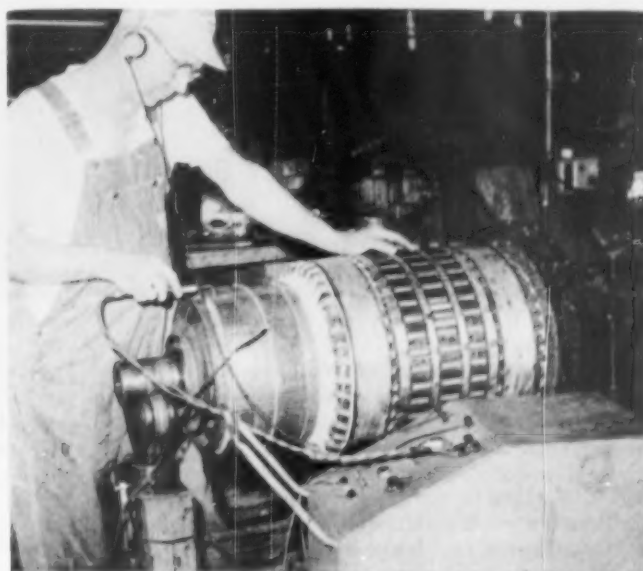
A HIGH-FREQUENCY ELECTRONIC generator, developed in the Dale Street, St. Paul, Minn. shops of the Great Northern, serves effectively to locate faults in machine windings. The device generates 25 watts of 1,000-cycle current by means of a tuned electronic oscillator. The oscillator is coupled to a push-pull amplifier and the out-

put transformer is tapped so that the transformer impedance may be matched to the load impedance to provide maximum output. A milliammeter on the panel shows plate current so that the operator may avoid overloading the amplifier.

The device is used to locate grounds or shorts in any



The exploring coil is moved over the pole piece until the ground is located.



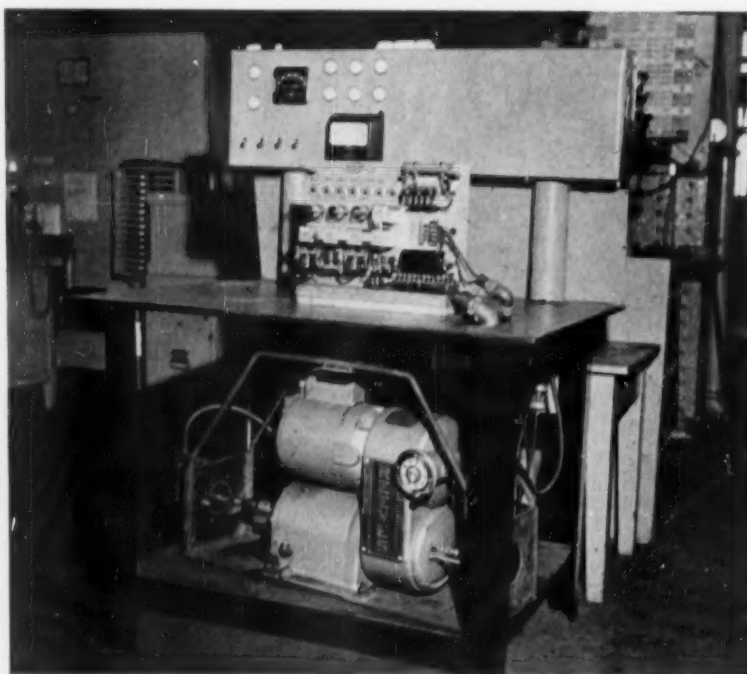
The generator is used for locating faults in armature coils. The string around the commutator holds one of the terminals.



electric equipment. For the detection of grounds, the output of the generator is connected between a coil terminal and ground. A pickup coil connected to a head set or meter is used to find the exact location of the ground. In some cases, a loud speaker is used. The meter is better than the head set for locating grounds since it gives a better indication of variations in pickup.

To locate shorted coils in armatures, the output is connected to the commutator, placing the leads on bars which are brush distance apart. Then bar-to-bar tests are made with the head set. When a faulty coil is encountered, a loud sound indicates an open coil and a reduction of sound indicates a short. This procedure is particularly useful when an armature is being wound since it insures against the inclusion of faults. It also serves effectively to locate the source of trouble in faulty armatures which are brought in for repair. Because its findings are accurate, and it is easy to operate, the device is used as much as any other equipment in the shop. The exploring coil may also be used on armatures to locate the position of faults.

## Test Stand for Transition Control Panels



JUSTUS TRANSITION CONTROL PANELS from Reading's Fairbanks-Morse Trainmasters are tested and calibrated on this special stand. The axle generator which provides the actuating voltage supply for transition circuits, driven by a Reeves variable speed unit is placed on a shelf in the base of the stand. The panel under test is placed on the stand, and connected to the voltage supply as shown. The two pilot lamps at the left of the test panel at the top of the stand show respectively that there is a-c current going to the Reeves unit and that there is d-c input to the panel being tested.

The meter adjacent to these pilot lamps indicates the d-c voltage applied to the panel, the source being adjustable to obtain 74 volts. The speed (rpm) or mph equivalent of the Reeves unit and the axle generator is indicated by the lower meter on the test panel. The six pilot lamps above the speed meter indicate the proper functioning and pick up points of the fail-safe, shunting, series-parallel and parallel transition circuits. Switches at the lower left of the panel board control the a-c and d-c input to the stand. The test stand was designed by the Reading and is used at Reading, Pa., shop.





One of the cabooses in service. The small ventilated compartment at the left houses the diesel-generator set. A 100-gal fuel tank beneath the compartment is filled from the outside. On top of the caboose (left to right) are the engine exhaust muffler, space heater chimney and radio antenna. At right:



Features of the new cabooses include a radio-telephone,  $4\frac{1}{2}$ -cu ft electric refrigerator, a two-burner electric stove. The generator set, which is operated continuously while a crew is aboard, supplies 5 kw of 120-volt, single-phase a-c power for the equipment.

## Milwaukee Equips Cabooses With 5-Kw Diesel Generators

COMMUNICATIONS, conveniences, comfort and safety are features of the new caboose now being placed in service by the Milwaukee. Designed with the men in mind, they rate high with every freight conductor and rear brakeman.

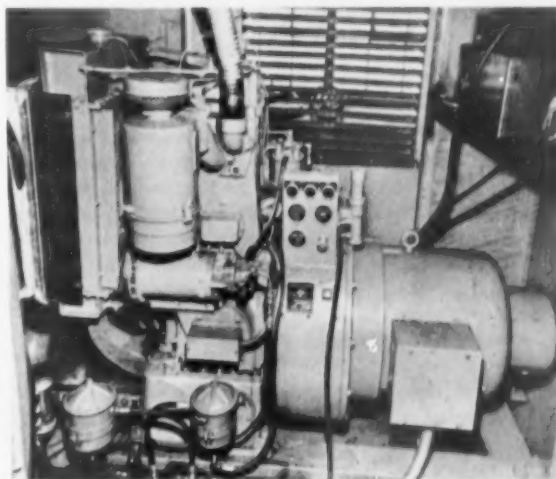
Each caboose is equipped with a high frequency radio. The transmitter is located on one wall and the hand set is mounted on the opposite wall above a work table. The conductor, engineer and various stations along the line are all on one frequency so they can quickly communicate with each other.

A combination sink, refrigerator and stove unit is also installed in the car. The refrigerator has a capacity of  $4\frac{1}{2}$  cu ft and the stove has two electric heating units. These convenience items enable the train crew to keep staple foods on board and to warm soup, coffee, etc. An oil-burning space heater is located opposite the kitchen unit.

On a number of the cabooses, electric power for the radio, stove-refrigerator unit, inside lights and outside marker lights, is obtained directly from a self-contained Nordberg Power Chief engine-generator set. The one-cylinder diesel unit is direct-connected to a 5-kw generator which produces 120-volt, single-phase a-c current at 1,200 rpm.

The entire set is mounted on special shock resistant mounting rails and is installed in a soundproof compartment in one corner of the caboose. The engine controls are on a panel on the engine while the generator switch board is mounted on the compartment wall, but facing the inside of the caboose.

The engine has a complete radiator cooling system. Fresh air enters the engine compartment through a ventilator on the side of the car and is blown through a special, heavy duty radiator, designed to stand the shocks

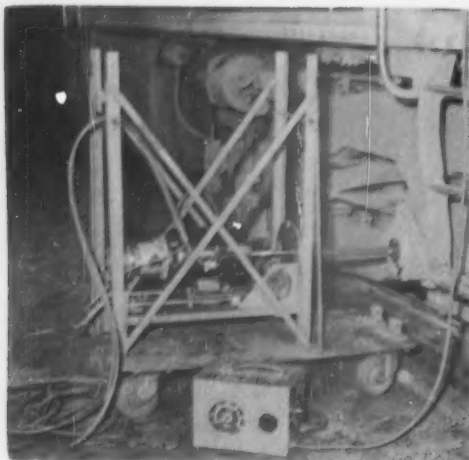


Special shock resistant mounting rails and a complete radiator cooling system are features of the compact, one cylinder diesel-generator set which is installed in a corner compartment of the caboose.

encountered in railroad service. From the radiator, the air is forced outside through another ventilator by a pusher type fan on the engine. Beneath the engine is a 100-gal fuel tank that is filled from the outside. Both the engine and space heater draw fuel from this tank.

The service history of the engine shows that during a six-month period, the engine ran approximately 2,000 hr, and was started and stopped 175 times. During this time, the caboose traveled 43,347 miles on various length runs, including the 3,612-mile round trip from Minneapolis, Minn. to Tacoma, Wash. There are no storage batteries for reserve power and the engine is operated continuously while the crew is abroad. Operated solely by the train crews, the engine did not require maintenance of any kind.

The generating set maintains a voltage regulation of less than plus or minus 2 per cent. The engine has an ether capsule starting system for use in cold weather and safety controls which stop the engine in the event of high water temperature or low lubricating oil pressure.



Above: The variable-speed motor on the truck drives both the axle-generator through the flexible shaft and the direct-connected generator which operates the speedometer in the control box. At right: With the control box on his knee, the operator compares the performance of the locomotive equipment with that of the calibrated generator and speedometer.

## In-Place Speed Control Check

A tester for General Electric locomotive axle generators developed in the Marion, Ohio, shops of the Erie assures close check of motor shunting and transition, and accuracy of the locomotive speedometer. It provides a means of driving the axle generator from an outside source while comparing its output with the output of a laboratory-calibrated generator and speedometer.

The equipment shown on the truck consists of a one-horsepower, variable-speed d-c motor directly connected at one end to a calibrated generator which is a duplicate of the axle-driven generator on the locomotive.

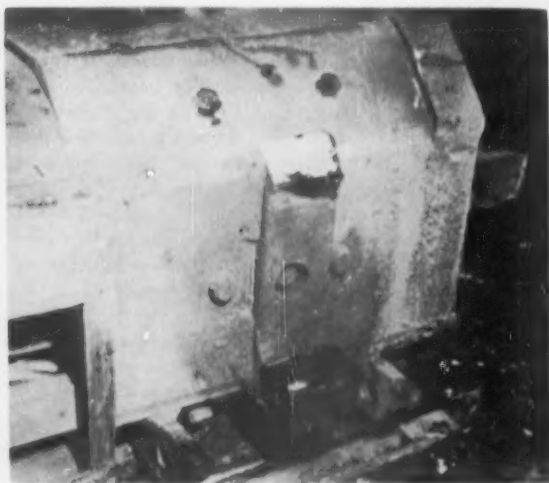
On the other end of the motor is a flexible shaft having a coupling at its outer end which fits the drive coupling on the locomotive. To couple the outside drive, the axle-

generator cap is taken off, and the splined shaft pulled out. The flexible shaft coupling is then connected to the locomotive generator shaft.

Power for driving the motor is obtained from the locomotive battery and the speed of the motor is controlled by a field rheostat. The rheostat and a calibrated speedometer are contained in a control box on the end of a cable long enough to reach from the truck to the engineman's position in the cab.

To make the test, the operator sits in the cab with the control box and runs the motor at varying speeds, while he compares the reading of the locomotive speedometer with the indication of the calibrated instrument in the box.

The height of the generator drive on the truck is adjustable to take care of various differences in height between the tracks and the floor. The drive can be moved up and down in the angle-iron rack and locked in any desired position.

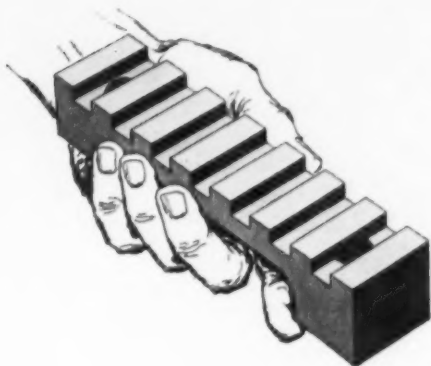


Plastic surgery for Motor Noses. Traction motor with nose suspension bracket broken can be repaired when motor brackets have opened up in service so that bearing surfaces are no longer parallel.



Bracket can be removed and replaced by Oxy-acetylene welding. A reinforcing rib can be used to add strength to the bracket, and various models of motors have been repaired.

# How R-S JOURNAL STOPS will further Reduce Solid Bearing Operating Costs and pay for themselves in less than 3 years!



*Tests have proved that this new device will greatly improve bearing performance and journal lubrication, will at least double bearing life, reduce wheel flange wear and make other significant savings in freight car operation.*

**S**TABILIZE the solid bearing assembly and you approach the maximum in bearing performance. You do just that with R-S Journal Stops. Best of all, they pay for themselves in less than 3 years. Here's how:

First, you reduce routine yard servicing and oiling requirements. Packing seldom needs adjustment, and you don't need oil so often either. (Other lubricators, pad or mechanical, will benefit, too). You cut car oilers' time in half, and inspectors' time by as much as 25%. When enough cars are Journal Stop equipped that could mean savings close to \$18.00 per car per year.\*

Second, all indications point to 3-year periods between periodic attention as required by Rule 66. That would cut current costs in half — save as much as \$6.00 per car per year.

Third, and conservatively, you'll reduce road repair costs to a third of what they now are — possibly a great

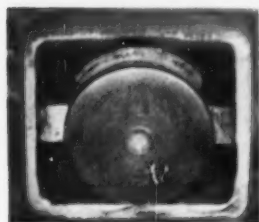
deal more. That means minimum savings of \$6.00 per car per year.

Fourth, you'll cut bearing consumption in half — use less than 1½ bearings per car per year. In annual savings that will mean about \$4.00 per car.

The above four items alone represent potential annual savings of \$34.00 per car. Add to these the tremendous savings due to reduced wheel flange wear and a 3-year recovery estimate is probably conservative.

One private car company whose total savings are determined largely by billings that don't cover servicing costs, has already estimated recovery of total installation costs in less than 3 years. Operating roads will save even more. Write us today for full information. Magnus Metal Corporation, 111 Broadway, New York 6; or 80 E. Jackson Blvd., Chicago 4.

\*These and other estimated savings are based on unbiased studies of AAR solid journal bearing operating costs.



Unretouched photo of the RS Journal Stop installation with conventional waste packing. Other lubricators are similarly "contained."

## MAGNUS Solid Bearings

MAGNUS METAL CORPORATION

Subsidiary of NATIONAL LEAD COMPANY



# **COBRA** <sup>✦</sup>**SHOES** make to lightweight



The superior friction characteristics of the Cobra Shoe have simplified the design of air brake equipment and related components, and made possible major reductions in weight, space requirements, and costs of braking systems for lightweight trains.

Only composition shoes can meet the braking requirements of these trains.

Of the eight lightweight trains in service or under construction, six use Cobra Shoes on all cars and locomotives.

Cobra Shoe performance has been proved in all classes of passenger service.

Write for complete information to Railroad Friction Products Corporation.

## **The COBRA** <sup>✦</sup>**SHOE**

Product of the combined research facilities of...

**Westinghouse Air Brake Company**

*Specialists in Braking*

**RAILROAD FRICTION PRODUCTS**



# important contribution train development

- 
- Reduce weight
  - Reduce equipment space
  - Reduce cost

The COBRA Shoe for railroad cars, locomotives and subway cars—a result of eight years of research.

COBRA Shoes assure smoother, quieter stops and less vibration.

**Johns-Manville**

*Specialists in Friction Materials*



Registered U. S. Trademark  
Composition Brake Shoe

**CORPORATION, Wilmerding, Pennsylvania**



## WHERE THE TOUGH ONES ARE HANDLED

A new question this month. Remember that it pays you to share your ideas and experiences with our readers. Submit letters to the Problem Page Editor.

Does experience with cylindrical treads for passenger car wheels justify their use from the standpoint of riding qualities? Does their use change or complicate maintenance procedures? What wheel life is obtained? What is the exact contour of the tread for which data can be reported?

### DO DIESELS START FIRES?

Can the responsibility for track-side fires ever be laid to diesel-electric locomotives?

*(Discussion continued from the September issue)*

**NUMEROUS CAUSES**, by W. King Simpson, Technical Director, Fuels and Lubricants, Electro-Motive Division. (At the 1956 meeting of the Railway Fuel and Traveling Engineers Association, during a panel discussion on economy fuels, Mr. Simpson answered the following question: What is the relationship between wayside fires, diesel exhaust sparks and the use of economy-type diesel fuels?)

The obvious answer to this question would involve many different approaches as to why a diesel engine would blow sparks which are so strong, so large and so hot that they could reach the ground and bounce around, thus creating a fire hazard. Basically, anything affecting fuel combustion adversely could cause a condition resulting in exhaust sparks.

One of the most important things of all, of course, is the size of the spark in relation to its strength. Some mainline railroads have always employed spark arrestors on diesel locomotives which have been effective in breaking up the size of the incandescent particles.

From the fire hazard point of view, the relative humidity of the vegetation and the control of this wayside vegetation by the railroad obviously are the most important factors in what happens once the spark hits the ground.

Let's consider the variables in locomotive operation that must be watched when a diesel engine is blowing exhaust sparks; usually it is not an entire fleet of locomotive engines that is involved in a sparking type of phenomenon. However, if all of your units suddenly start to blow sparks on about the same day, someone has given you a fuel containing a metal-type of additive. While these additives have been used in home heating oils, sometimes these fuels are diverted to railroad usage. Some of these metal additives do promote exhaust sparking.

Another phenomenon which would enter into sparking conditions would be a failure of the water temperature regulation system. Abnormally cold water in the engine tends to produce excessive exhaust sparking. Even when a locomotive is in good condition but stands idling for twelve or more hours and then goes out on the road, it is going to blow a certain number of sparks. Fortunately, these sparks are usually quite small and they disappear, losing their incandescence on the way upward. We do not believe that this type of spark will ever start a fire.

A very bad injector condition can produce excessive sparking. This often can be detected by excessive smoking at idle.

Another phenomenon is that produced by a water leak in the cylinder head area. In the older days, some of the railroads actually had a report from which was filled in by a tower watchman. If a locomotive went by blowing sparks, he would report it and the maintenance people would look for a water leak in the cylinder head area. You can see from this that this part of the problem has been recognized for at least ten years.

In all the investigations of wayside fires, there have been other angles which can enter, such as the carelessness of motorists involving matches or cigarettes, incendiary techniques employed by certain irresponsible people, locomotive steam generator sparks, and our old friend, the brake shoe spark, still is to be reckoned with.

### Economy Fuels

As far as the economy fuels are concerned and their relationship to the overall phenomena of way-side fires, we do not believe that they would make the situation any more critical than an ordinary diesel fuel. If a poor combustion and we certainly would not expect fuel is to contribute to this trouble, it must involve extra poorer combustion on the type of fuels that we are defining as economy fuels today.

We believe that the use of spark arrestors should be considered as it will help to convince the public that the railroads are trying to do everything possible to avert trouble. Spark arrestors have been used on steam locomotives and we see no reason why the proper type of spark arrestors cannot be employed on modern day diesels, unless someone builds a tunnel with no overhead clearance.



Every car  
needs the protection  
of Waugh Cushion  
Underframe, but  
none more than  
this car at the end  
of the train.

For greater safety  
on all cabooses  
... specify

# **WAUGH**

## **Cushion Underframe**

WAUGH EQUIPMENT COMPANY, New York • Chicago • St. Louis • Canadian Waugh Equipment Co, Montreal

## 24-RL Brake Equipment

*This is a new series of Questions and Answers pertaining to recent developments in the 24RL air brake equipment for road locomotives. The first questions will deal with the Pressure Maintaining feature. Authorized persons may obtain information on this subject in Instruction Pamphlets 2606-1, and 2601-1 Supplement 1 by communicating with their nearest Westinghouse Air Brake representative.*

**R37-Q—Is the service application portion interchangeable?**

**A—**The service application portion is identical on the DS-24 and DS-24-MC brake valves but the one on the DS-24-M brake valve is not interchangeable.

**R38-Q—Is the bank application portion interchangeable?**

**A—**It is with the DS-24 and DS-24-MC but not with the DS-24-M brake valve, which is cored differently and has attached, the maintaining cut-off valve.

**R39-Q—How many types of filling pieces are in use?**

**A—**Three. There is no interchangeability among them.

**R40-Q—What portions are included in the Filling Piece on the DS-24-M brake valve?**

**A—**1. first service portion, 2. brake valve cut-out valve portion, and 3. equalizing portion.

**R41-Q—Describe the first service valve in the DS-24-M brake valve?**

**A—**It is a spool valve with "O" rings. Suppression in first service position is controlled through this valve and is cut out when the first service function is not used.

### Operation

**R42-Q—Does the charging operation of the service application portion piston chamber take place in a similar manner in all of the brake valves under discussion?**

**A—**Due to the difference in construction, main reservoir flow to the piston chamber has been re-arranged.

**R43-Q—Explain this operation.**

**A—**Main reservoir air feeds through passage 30, directly to the under side of the piston head with a branch leading through a choke to the chamber above the piston and diaphragm. With the pressures equal, the piston spring holds the piston and slide valve in their lower position.

**R44-Q—Describe the flow of brake pipe air to the maintaining cut-off valve with the maintaining feature cut out and automatic brake valve in running position with the DS-24-M brake valve?**

**A—**Brake pipe air as supplied from the feed valve flows through passage 2c from the rotary valve, through a passage in the service application slide valve to passage 2a. Then it goes through passage 2a to the spring chamber of the pilot valve piston in the maintaining cut-off valve assembly with a branch to the brake pipe cut-off valve.

**R45-Q—Describe the flow of feed valve air to the maintaining cut-off valve.**

**A—**Feed valve air (independent of the rotary valve) flows through a branch of passage 2l to the spring chamber beneath the maintaining cut-off valve which remains closed as long as the pilot valve lever is in *OUT* position.

**R46-Q—Describe the flow of brake pipe air in the maintaining cut-off valve assembly with the pilot lever in *IN* position.**

**A—**With the lever in *IN* position its spring holds the pilot valve piston in its upward position permitting brake pipe air in passage 2a to flow to the chamber above the maintaining cut-off piston.

**R47-Q—What action then takes place?**

**A—**The piston is forced downward, its stem contacting the cut-off check valve and holding it away from the seat.

**R48-Q—With the check valve held open, what takes place?**

**A—**Feed valve air from passage 2l is free to flow past the open check valve into passage 14a to the equalizing portion.

**R49-Q—Describe the flow of feed valve air in the equalizing portion with the brake valve handle in running position.**

**A—**From passage 14a, feed valve air flows through a strainer and choke to the spring chamber under the maintaining valve. In running position pressures above and below the valve are equal and also as the stem of the equalizing piston is not contacting the maintaining valve, the valve spring holds it seated.

**R50-Q—What prevents the equalizing piston stem from contacting the maintaining valve and holding the valve unseated?**

**A—**Brake pipe air beneath the equalizing diaphragm is equal to that of equalizing reservoir pressure above it, therefore there exists no differential to move the piston downward.

**R51-Q—Describe the flow of brake pipe air to the maintaining cut-off valve assembly on the DS-24-MC brake valve in running position.**

**A—**Brake pipe air flows from passage 2 to 2a around the spring end of the interlock cut-off valve piston into the maintaining cut-off valve pilot valve chamber, spring end, and with the lever in *IN* position air is free to flow to the chamber over the maintaining cut-off piston as previously described.

**R52-Q—Describe the flow of main reservoir air to the interlock cut-off valve on the DS-24-MC brake valve during a penalty application.**

**A—**When a penalty application is initiated, the service application portion slide valve connects main reservoir air to passage 25, a branch of which leads to the chamber back of the interlock cut-off valve.





*This is the twelfth in a series of advertisements about the people of Standard.*

## He Sells Service to the Railroads ...and gives trouble to the ducks

This is William B. Reed.

"Bill" likes waiting in a blind to get his marksman's share of ducks, and enjoys most other outdoor activities. These days, with his son at the University of Wisconsin, he likes traveling to Madison.

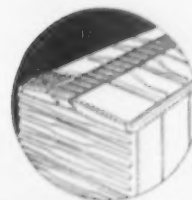
"Bill" also likes selling Standard products to the railroads in the Twin Cities and to the east of Chicago. His territory is big and so is his job, for

he sells by giving service to Standard customers.

"Bill" Reed is the kind of salesman you have learned to expect as your Standard representative. His mission is helping you. And, whether your order is for one car or hundreds—for new car parts or replacement on existing equipment—you can depend on Standard to get cars on the road, paying their way.



Improved Dreadnaught Ends



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9 out of 10 house cars  
now in operation on  
America's railroads are  
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# QUESTIONS and ANSWERS

## General Motors

### Diesel-Electric Locomotives

*This is a series of Questions and Answers pertaining to General Motors diesel-electric locomotives. The references to manual and page numbers in the text indicate where the original material may be found in the builder's technical publications or instruction manuals. These are usually available to authorized employees on each railroad.*

#### Multiple Unit Operation With Other Models.

**G539-Q**—With what units in many instances, may be desirable to operate the F7 unit in multiple?  
**A**—With FT, F2, F3, or GP7 units.

**G540-Q**—How should the units be operated as far as transition is concerned?  
**A**—It is generally advantageous to operate as many units as possible in automatic transition.

**G541-Q**—What must be done in case any unit in the consist must be operated in manual transition?  
**A**—The engineman must effect transition according to speed, depending on the gear ratio of the unit or units being operated manually.

**G542-Q**—What should be the throttle position when manually shifting?  
**A**—The throttle must be in Run 6 or lower when manually shifting transition from 2 to 3 or 3 to 2.

**G543-Q**—If the units of the consist are of different gear ratios and/or different continuous ratings, what care must be observed for the unit geared for the highest minimum speed?  
**A**—The locomotive should not be operated so that it is overloaded by being operated below that speed, or in the short time rating.

**G544-Q**—What care must be taken for the unit having the lowest maximum permissible speed?  
**A**—The locomotive must not be permitted to operate at speeds in excess of that for the unit involved.

#### Operating With a Helper Locomotive

*Manual 2310, Page 219*

**G545-Q**—Is there any difference in the instructions for operating the locomotive with a steam or diesel helper as compared to operating the locomotive without a helper?  
**A**—Basically there is no difference.

**G546-Q**—What should always be attempted in order to avoid possible damage to the electrical equipment?  
**A**—It is always desirable to reach the top of the grade in the least possible time.

**G547-Q**—Do the tonnage ratings of helper locomotives agree with those of the principal locomotive?  
**A**—Helper locomotives may have tonnage ratings which are based on lower speeds.

**G548-Q**—What may be done under such conditions?  
**A**—Under these conditions it is permissible to operate the principal locomotive within the limits of the short time ratings.

**G549-Q**—Explain this helper operation further.

**A**—Under the same conditions, when the drag speed of the helper locomotive is lower than that of the principal locomotive, it is permissible to reduce the throttle of the principal locomotive, when the 3th throttle operation results in a meter reading that exceeds the maximum short time rating.

**G550-Q**—How must the throttle be handled as the higher short time ratings are consumed?

**A**—The throttle must be reduced as the higher short time ratings are consumed, but should not be operated below the 5th notch.

*Manual 2310, Page 220*

**G551-Q**—What must be done in case the principal and helper locomotives are identical model diesels and are of the same gear ratio?

**A**—The principal locomotive will be obliged to operate within its continuous rating to conform with the helper locomotive operation.

#### Operating As a Helper Locomotive

**G552-Q**—What is the nature of the operation of a helper locomotive?

**A**—The nature of the operation of a helper locomotive is contingent upon the handling and performance of the principal locomotive.

**G553-Q**—Is it possible that the helper locomotive, due to unforeseen circumstances, will be called upon to assume more than its normal share of the load?

**A**—Yes, due to the lack of communication between the helper and locomotive.

**G554-Q**—In view of this what should be done?

**A**—The helper should be assigned tonnage consistent with its continuous rating.

**G555-Q**—What will be the result if this is done?

**A**—This will permit the helper locomotive to assume a larger share of the tonnage and still not exceed its short time ratings when the unexpected occasion arises requiring the principal locomotive to reduce throttle.

#### Double Heading

*Manual 2310, Page 221*

**G556-Q**—What should first be done prior to double heading behind another locomotive?

**A**—A full service brake pipe reduction should be made with the automatic brake valve and the double heading cock closed.

**G557-Q**—What else should be done?

**A**—The rotair valve should be left in the proper position (depending on the type of service) and the automatic brake valve handle returned to *running* position.

**G558-Q**—How are the brakes then controlled?

**A**—By the lead locomotive.

**G559-Q**—Is it possible for the engineman on the second locomotive to apply the brakes in emergency with the automatic brake valve?

**A**—Yes.

# Congratulations!

... to the American Telephone & Telegraph Company upon the completion of the new Transatlantic cable linking Europe and America.

This engineering achievement, the result of cooperative American and British enterprise, signalizes a new era of greatly improved Transatlantic telephone service.

Simplex Wire & Cable Co., as manufacturer and supplier of the American-made part of the submarine cable used in this gigantic project, is understandably proud to have participated in this historic accomplishment, and in the development work which made it possible. **SIMPLEX WIRE & CABLE CO.**, 79 Sidney Street, Cambridge 39, Mass.

## Simplex

Wires and Cables for:



TABLE III  
Annual labor & material costs for  
maintenance of solid bearing assemblies

DESCRIPTION	CURRENT COSTS (AAR)	PREDICTED COSTS
Repairing Hot Box Set-Outs .....	\$ 9.05	\$ 2.26
Damage to Equipment .....	2.01	.50
Fires Due to Hot Boxes .....	.29	.07
Cut Journals Found During Routine Inspection & Servicing .....	1.35	1.01
Defective Bearings Found During Routine Inspection .....	2.69*	1.35
Periodical Lubrication—Rule 66 .....	11.10	5.55
<i>Labor—not included above</i>		
Routine Transportation Yard Inspection .....	40.82	24.11
Cleaning and Repacking Journal Boxes at Wheel Defect Renewals .....	.20	.20
Applying Spring Packing Retainers .....	.08	0.00
<i>Material—not included above</i>		
Defective Bearing Replacements .....	4.36*	2.18
New Axles .....	3.35	3.35
Journal Box Oil .....	2.87	1.44
Prepared Packing (Lubricators) .....	1.73	13.33
Journal Box Lids .....	.64	.64
Spring Packing Retainers .....	.46	0.00
Journal Box Wedges .....	.29	.29
Journal Box Dust Guards (Seals) .....	.08	1.67
TOTALS .....	\$81.37	\$57.95

\* AAR figures corrected for 4,500,000 bearings per year.

(Continued from page 43)

source. Bearing life should be doubled, and there should be at least a 25% reduction in cut journals.

"These developments also assure the practicability of 3-year intervals for periodic lubrication and inspection of bearing assemblies as required under Rule 66—halving current cost. Moreover, when used in conjunction with rear seals, they will make yard inspections on a calendar basis possible. The same number of inspectors may be required, because bearings, whether solid or roller, do not determine the size of the inspection force, but oilers' time and oil consumption will be cut in half. The effect of all these benefits on operating costs can be seen in Table III.

"These savings will be partially offset by an increase in the cost of lubricators and seals for maintenance and operation. A three year life for both lubricators and seals is assumed, with initial costs of \$40.00 and \$5.00 per car, respectively. No consideration has been given stores expense or scrap credits which would tend to offset each other. It is entirely possible that certain lubricators may be reconditioned for repeated re-use which would effect very sub-

stantial savings in annual replacement costs.

"It is believed that shimmed journal stops for preventing excessive axle displacement will so reduce the requirements for an economic rear

seal as to make possible its development and early availability at the approximate price indicated. It is recognized, too, that the use of shimmed stops will involve slight extras for reshimming at wheel change. However, these costs for reshimming may be recovered in full measure by reduced wheel flange wear and the consequent extension of wheel life.

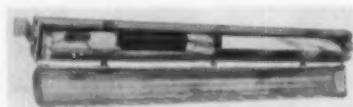
"Another means of preventing excessive axle displacement due to accelerating and decelerating impacts is the use of the flat back bearing. This flat back bearing has been used for years in passenger cars equipped with six-wheel trucks having only one brake shoe per wheel and has demonstrated its ability to limit axle displacement, thereby improving bearing, wheel and rear seal performance."

The Advisory Committee study arrives at this conclusion: "Overall savings from improved lubrication and stabilizing bearing assemblies (as outlined in Table III) can be realized in a relatively short period of time. This will have the following beneficial results: (1) operation and maintenance of solid bearing cars will actually cost considerably less than the operation and maintenance of roller bearing cars; and (2) solid bearing cars will continue to enjoy a very considerable advantage in initial cost."

## EQUIPMENT

(Continued from page 8)

according to the manufacturer, are simplified operation, lower installation and power costs, and X-ray welds for inert gas, submerged arc, semi-automatic and all metallic-arc automatic welding processes. *Harnischfeger Corporation, Welding Division, Dept. RLC, Milwaukee 1.*



## Outdoor Fluorescent Light Fixture

This type HLJ aluminum fluorescent fixture, said to be rugged and weatherproof, is for tunnels, underpasses, loading docks, shed areas, etc. It weighs 50 lb, is 72½ in. long, and consists of two assemblies—a housing for the lamps, ballast, wiring, and reflectors,

and a door, which supports a gasketed, clear-ribbed plastic cover.

The reflectors, made in two sections for handling ease, can be removed by hand pressure. Removing one reflector section gives access to the terminal block and ballast. Through L-shaped brackets, the device can be mounted in rows, then rotated horizontally to any desired position. A degree scale on the end hub of each bracket assures accurate alignment. These 95-watt, rapid start units are offered in cool or warm white. *Crouse-Hinds Company, Dept. RLC, Wolf and Seventh streets, Syracuse, N.Y.*

## Vinyl Upholstery

Additions to Naugahyde vinyl upholstery include two patterns in Breathable Naugahyde, a line of Elastic Naugahyde with metallic finish, a line of light weight Elastic Naugahyde, and a lightweight Naugahyde laminated with metallized Mylar.

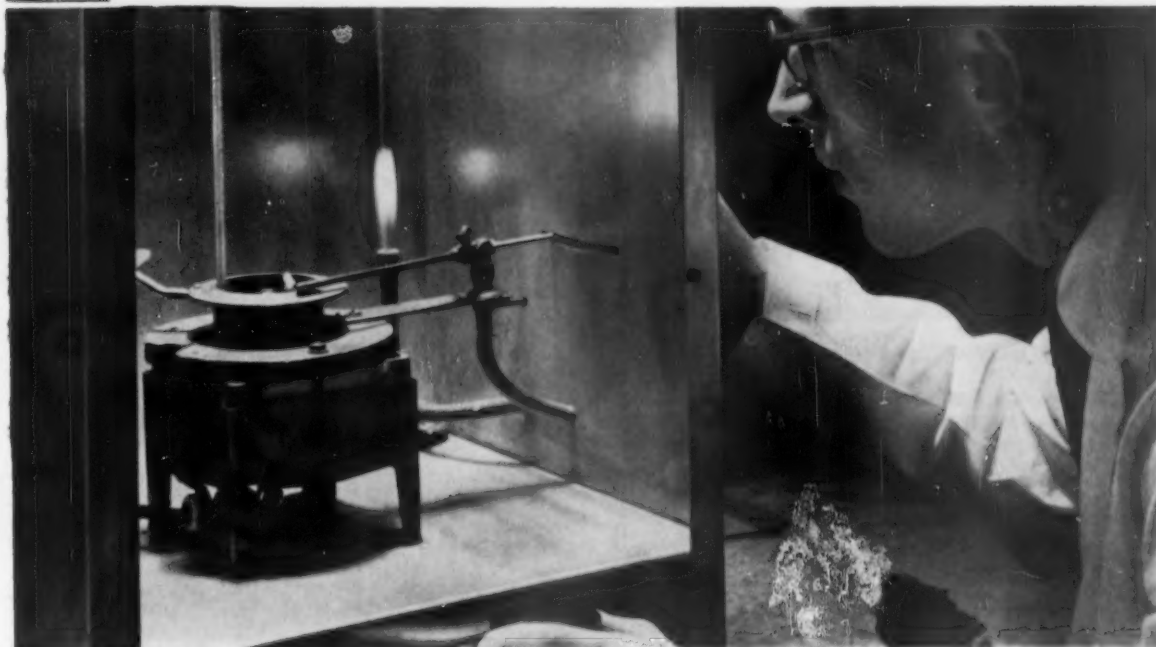
The two Breathable patterns are Flair and Random. Flair, woven with silver

(Continued on page 76)





Dow . . . industry's most complete line of chlorinated solvents



NO FLASH OR FIRE POINT is shown for CHLOROTHENE when tested by the Cleveland Open Cup Method, the standard procedure.

## Here's convincing proof of why Motive Power Departments like to clean with effective, safer CHLOROTHENE



**CHLOROTHENE GIVES FAST,** thorough cleaning when used on diesel locomotive armatures, electrical cabinets, generators, traction motors and other equipment.

Railroads' rigid safety standards extend to *all* departments. Safer cold degreasing solvents have been demanded for some time by Motive Power Departments. This demand is now ideally met with CHLOROTHENE\*.

The great advance demonstrated above, *lack of a flash or fire point* for CHLOROTHENE, is *one* of the properties that

make it a real safety solvent. Another, of equal importance, is *much lower toxicity*: CHLOROTHENE has an M.A.C. rating of 500 ppm. This figure is  $2\frac{1}{2}$  times the rating for trichloroethylene and a full 20 times greater than carbon tetrachloride's rating.

And versatile? CHLOROTHENE (Dow 1,1,1-Trichloroethane, Inhibited) can be sprayed or used effectively as a wipe, dip or bucket cold cleaner. This stabilized Dow degreasing solvent has very high stripping power, yet gives extremely low corrosive effects. Call your Dow distributor . . . use CHLOROTHENE . . . and bring new safety into your shops. For detailed technical information, please return coupon to THE DOW CHEMICAL COMPANY, Midland, Mich. \*Trademark

THE DOW CHEMICAL COMPANY, Dept. S-949H-2, Midland, Michigan

Send me technical information on CHLOROTHENE.

I'm interested in how well it cleans:

Name \_\_\_\_\_

Title \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

Zone \_\_\_\_\_

State \_\_\_\_\_

you can depend on DOW SOLVENTS



## Working at the outer boundaries of knowledge



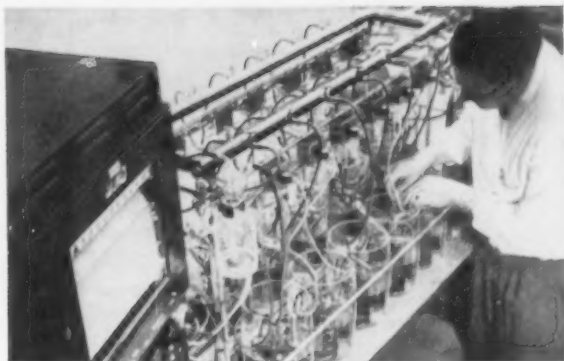
**New Research Laboratories in Parma, Ohio.** To expand its pioneering work in solid state and chemical physics, National Carbon Company has enlarged its staff of scientists and provided them with an ideal laboratory setup for creative work. Typical of their modern equipment is an *arc radiation furnace* used for work on high-temperature experiments. It brings light from a carbon arc into focus on a tiny pin-point area, achieving an intensity of several hundred million foot-candles — *approaching the intensity of light near the surface of the sun.*

# New

### **Mechanized tweezers handle graphite crystal.**

To make it into a proper experimental guinea pig, the fragile crystal must be painstakingly cut and mounted so that electrical flow can be measured along the unique crystal-line directions in graphite. Experiments with pure crystals are important because all materials which we know as carbon and graphite are basically composed of the same graphite crystals being prepared here. Tremendous differences in electrical behavior and other vital properties can be traced to variations in size and arrangement of the graphite crystals in carbon products.





**Seeking battery of the future.** The "fuel cell", a battery producing electricity from such gases as hydrogen and oxygen, is one of many devices being developed at the Parma laboratories—part of a far-ranging research program aimed at improving batteries and carbon elements used in batteries.



**The sky's the limit for brush tests.** This experimental chamber simulates atmospheric conditions from sea level up to stratospheric heights of ten miles or more, with controlled variations of temperatures and humidity, for development of carbon brushes to meet specific operating needs.

# break-through in carbon physics research

*promises future advances in carbon brushes,  
signal cells and other railroad needs*

One more barrier is down. And science strides forward in the age-old quest for deeper knowledge of carbon, one of nature's more complex puzzles.

This barrier—the inability to get large graphite crystals pure enough for experimental needs—has now been overcome by researchers of National Carbon Company. Their new annealing techniques, which remove impurities from large graphite crystals, also eliminate imperfections and weaknesses in the crystal-line structure.

Several research teams at the new Parma laboratories are exploiting this break-through of science. The new purified crystals are now being subjected to a variety of experimental tortures—elec-

trical, magnetic and thermal.

Fundamental facts about the behavior of the single graphite crystal are being gathered and pieced together like jigsaw cutouts—building up a more complete and systematic picture. In this way, our scientists will be better able to *predict* the properties of new carbon and graphite materials.

The work on single graphite crystals is only one phase of a broad research program in carbon physics. Railroads, as large users of carbon and graphite products, will share in the gains from this work of science at the outer boundaries of knowledge. Write for new booklet titled "Research," telling more about the work at the new Parma laboratories.

*Look to* **NATIONAL CARBON**

*for leadership in carbon and graphite products*

**NATIONAL CARBON COMPANY** • A Division of Union Carbide and Carbon Corporation **30 East 42nd Street, New York 17, N. Y.**  
Sales Offices: Atlanta, Chicago, Dallas, Kansas City, Los Angeles, New York, Pittsburgh, San Francisco. In Canada: Union Carbide Canada Limited, Toronto

Dayton V-Belts provide steady, dependable power transmission on all drive applications—are installed as original or replacement equipment on more cars than all other makes of V-Belts.

## Meet the Dayton Rubber Man







The Dayton 2" Cog-Belts\* your Dayton Railway Field Engineer will recommend for heating and lighting drives are original equipment on safety V-Belt Gear Box Drives manufactured by the Safety Car Heating and Lighting Company.

## who works for the Railroads!

He's a Dayton Railway Field Engineer who will help you solve your V-Belt Drive Problems for the price of a 3-cent stamp!

He's the fellow in overalls who works with railroaders in the field showing ways to improve V-Belt Drive performance and checking installations. He's an idea man who sits down at the drawing board with railway, electrical and mechanical engineers to assist in developing new V-Belt Drive equipment or methods of operation.

He's the man who knows, from actual experience on the job, what V-Belt equipment is best—and why. He's the man who will recommend the proper Dayton Rail-

way V-Belts or Cog-Belts\* to give you maximum performance from your V-Belt Drives—and then supervises the installation and checks the performance for maximum efficiency, dependability and economy.

He's the Dayton Rubber Man who'll work for your railroad and help you solve your drive problems whenever you wish. Just write The Dayton Rubber Co., Railway Div., Dayton 1, Ohio. Experienced Dayton Railway Field Engineers are available across the country.

## Dayton Rubber

World's Largest Manufacturer of V-Belts

Specialized Railway Representatives in Atlanta, Chicago, Cleveland,  
New York, San Francisco and St. Louis

© D.R. 1956

\*T.M.

# LIX

## DIESEL KLEAN HEAVY

# SAFER



LABORATORY RABBITS USED FOR TESTING LIX DIESEL KLEAN HEAVY

### TESTS CONDUCTED BY ONE OF THE NATION'S LEADING RESEARCH LABORATORIES\* PROVES THAT LIX DIESEL KLEAN HEAVY IS SAFER!

If you want a safer cleaner in your shop . . . then Lix Diesel Klean Heavy is the answer. There are no caustic ingredients to cause serious injury upon body contact. With normal use, inhalation of Lix is non-toxic. Because of its high flash point Lix Diesel Klean Heavy is not a fire hazard.

*You can do a better job safer* on all diesel equipment when you use Diesel Klean Heavy.

\*Test information available on request from our office.



Write, wire, or phone today for a free demonstration in your shop.

**THE LIX CORPORATION**  
(OF MISSOURI)

716 EAST 85TH STREET, Dept. RL-6  
KANSAS CITY, MISSOURI

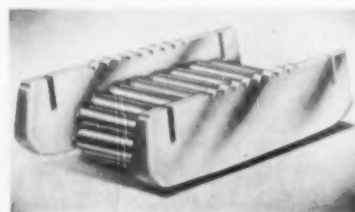
*"Leadership in Industrial Cleaning"*

## EQUIPMENT

(Continued from page 70)

Lurex thread, is available in two colors. Random, a non-directional vinyl pattern on fabric with a pearlescent finish, is made in 10 colors. Both are 53 in. wide.

The Elastic pattern with metallic finish comes in 8 colors, is 54 in. wide and weighs 34 oz. The lightweight Elastic pattern is designed for flat seating. It is produced in 20 colors. The metallized Mylar laminate is carried in a gold and silver finish and is suitable for trim, gimp, flat seating and other decorative purposes. *United States Rubber Company, Dept. RLC, 1230 Avenue of the Americas, New York 20.*



### Heavy Duty Roller

The Express roller, designed to aid in the moving of heavy equipment, works on the principle of caterpillar action. The unit is comprised of a series of moving rollers locked in an endless track, the track supported by a frame with serrated edges which grip the load being carried. These rollers are available in five sizes, from 2- to 150-ton capacities. Accessories include a revolving base plate and an optional handle which locks onto the plate. *Industrial East Co., Express Roller Division, Dept. RLC, Box 561, Clifton, N. J.*



### Shock-Measuring Instrument

This statistical accelerometer counts the number of times pre-selected "g" levels are equalled or exceeded. It is useful whenever it is desirable to know what shocks have been encountered.

The instrument consists of a group of acceleration-sensitive switches, built to make contact at predetermined levels and direction of acceleration, and a set of four

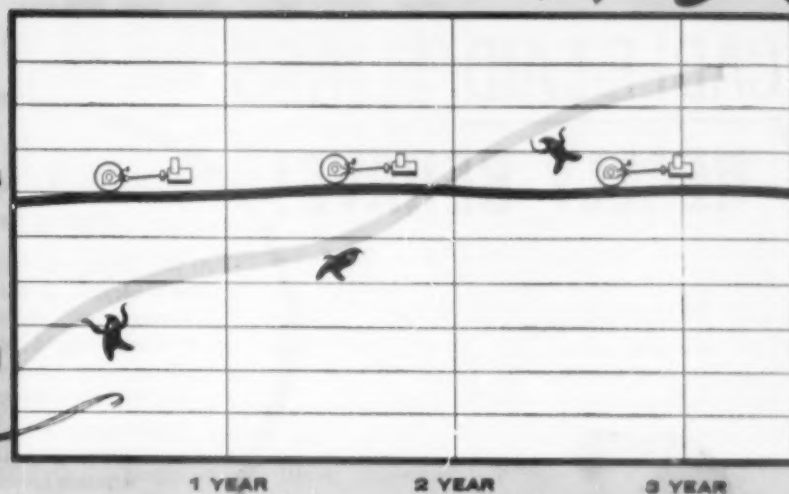
(Continued on page 84)

# Don't get "belted" by belt drive generator costs



**SPICER DRIVE \$500**

**BELT DRIVE \$250**



**Get the actual costs between belt-drive and Spicer Positive-Drive Generators . . . and find out what belt drives really cost you!**

**How much** are replacement belts going to cost you?

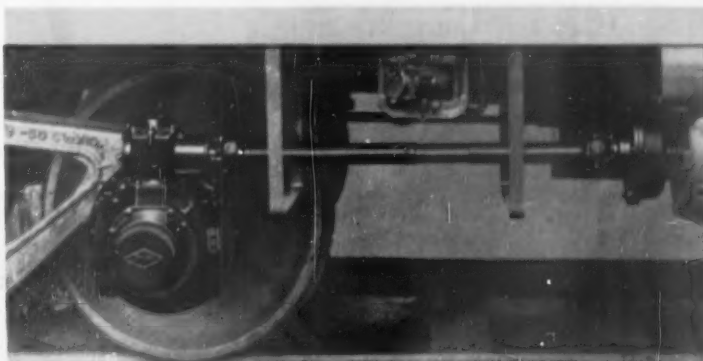
**How often** will they need replacement?

**How much** will labor for belt replacement cost?

**How much** will depleted batteries and shorter battery life due to belt failure cost you?

**How much** will loss of communications and its subsequent dangers cost you?

These are constant and continuing belt cost factors you cannot escape. Investigate the long-life economies and dependable performance of the Spicer Positive Generator Drive before you buy! Five ratios available for driving all makes and types of generators up to 5 KW.



Spicer Positive Railway Generator Drives can be quickly and economically adapted to new car designs and reconditioning jobs. Write for further details.

**DANA CORPORATION**  
Toledo 1, Ohio



**SPICER PRODUCTS:** TRANSMISSIONS  
UNIVERSAL JOINTS • PROPELLER SHAFTS • AXLES  
TORQUE CONVERTERS • GEAR BOXES • POWER  
TAKE-OFFS • POWER TAKE-OFF JOINTS • RAIL  
CAR DRIVES • RAILWAY GENERATOR DRIVES  
STAMPINGS • SPICER and AUBURN CLUTCHES  
PARISH FRAMES • SPICER FRAMES

# NEW ROEGAL CABLE-LAID SLINGS REALLY BEHAVE!



**Handle like hemp—yet all-steel strong!**

**Highest flexibility, do not kink!**

At last—a sling that won't snap back at you! That's because all the crankiness has been "trained out" of these remarkable new Roebing Roegal Cable-Laid Slings. No *extra-flexible* sling is stronger . . . or has greater resistance to shock and impact loads.

Each component is a strong, bright wire rope of drawn galvanized wire. Special flexible construction prevents shearing between the seven ropes—and each sling is all steel and machine-closed, with a tapered sleeve splice that assures full-rated capacity.

They're perfect, if you're handling pipe, tubing, finished machined parts and irregularly shaped loads, because they adapt themselves to load contours, and snug down easily in a choker hitch. Rigging and handling time is cut to a minimum!

Available in a variety of sizes, as chokers, or with single-leg or multi-leg construction. Can be furnished with loops, and standard wire rope thimbles, hooks and shackles. Find out today, from your nearest Roebing sales office, just how much of a lift new Roegal Cable-Laid Slings can give you.

# ROEBLING

*Subsidiary of The Colorado Fuel and Iron Corporation*

JOHN A. ROEBLING'S SONS CORPORATION, TRENTON 2, N. J., BRANCHES: ATLANTA, 934 AVON AVE. • BOSTON, 51 SLEEPER ST. • CHICAGO, 5528 W. ROOSEVELT RD. • CINCINNATI, 2340 GLENDALE-MILFORD RD., EVENDALE • CLEVELAND, 13225 LAKEWOOD HEIGHTS BLVD. • DENVER, 4801 JACKSON ST. • DETROIT, 815 FISHER BLDG. • HOUSTON, 6216 NAVIGATION BLVD. • LOS ANGELES, 5340 E. HARBOR ST. • NEW YORK, 19 RECTOR ST. • ODESSA, TEXAS, 1920 E. 2ND ST. PHILADELPHIA, 230 VINE ST. • ST. LOUIS, 5006 MINERVA AVE. • SAN FRANCISCO, 1740 17TH ST. • SEATTLE, 900 1ST AVE. S. • TULSA, 321 N. CHEYENNE ST. EXPORT SALES OFFICE, 19 RECTOR ST., NEW YORK





# Are you looking for low-cost cleaning products

# ?

If you're looking for a lower cost-per-pound, you're on the wrong track. There are so many other factors involved in cleaning costs, that the cost of the product becomes almost insignificant. For example, about 90% of the cost is labor. Then you've got to consider the cost of steam, cleaning equipment, damage to paint and light metals, etc.

What you really want are cleaning products that will give you better *cleaning results*—save you time and labor, and do a better job. Equally important, you want *cleaning methods* that will help you get the most from your maintenance personnel and equipment.

This is where we come in. Wyandotte is the largest supplier of specialized cleaning materials


for the railroad industry. We offer products for: vat cleaning, steam-gun cleaning, paint stripping, diesel-interior cleaning, diesel-exterior cleaning, passenger-car interior cleaning, passenger-car exterior cleaning—in fact, practically every cleaning job on your railroad.

**Because of these superior products, because cleaning is our business, and because of our vast experience in the railroad field, we have been able to develop cleaning methods that will positively give you better cleaning results at lower use-cost.**

For example, we can show you how to strip paint from a box car, rinse and phosphatize it, for less than \$5.00—and do it within 5 to 9 minutes! Or, we can help

you clean the inside of a diesel locomotive for less than \$1.50, and save one third of the labor cost!

So if you want cleaning results like these—and who doesn't?—get in touch with your local Wyandotte representative. He's an expert in railway-cleaning procedures . . . and he can help you cut cleaning costs to an absolute minimum. *Wyandotte Chemicals Corporation, Wyandotte, Michigan. Also Los Nietos, Calif. Offices in principal cities.*

 **Wyandotte**  
**CHEMICALS**  
J. B. FORD DIVISION

## COMPLETE LINE OF CLEANERS FOR ALL RAILWAY NEEDS

----- For further information, clip and mail coupon today! -----

**Wyandotte Chemicals Corporation**  
**Wyandotte, Michigan**

Gentlemen: I would like more information on \_\_\_\_\_

(cleaning procedure)

☐ Have representative call on me.

Name \_\_\_\_\_

★

★

★

★

★

★

Railroad \_\_\_\_\_

Department \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_

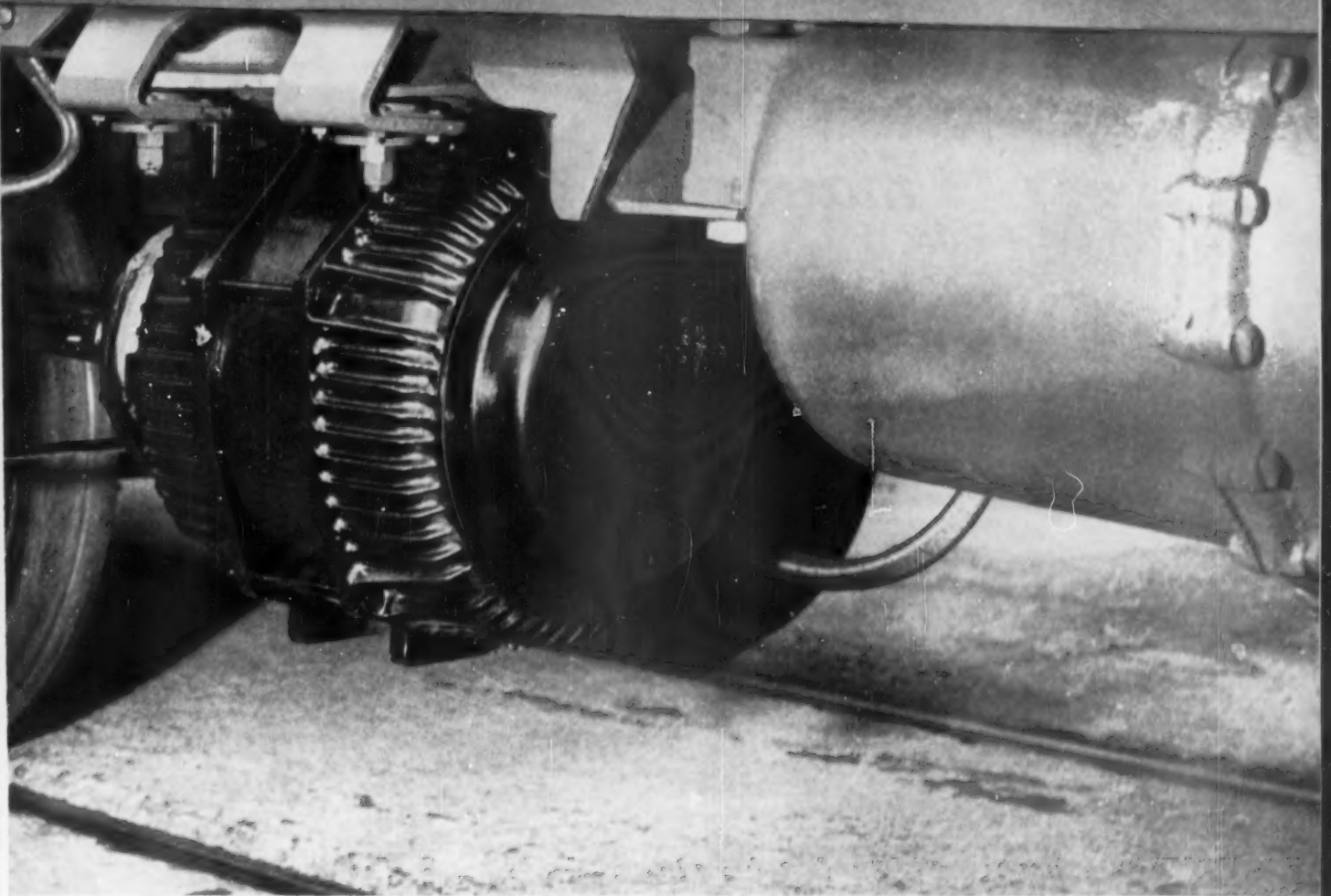


# GENERAL ELECTRIC'S AXLE-DRIVEN PRODUCE ALL THE POWER

A wise, long term investment, the high capacity G-E Power Supply pictured above for cabin and head-end cars is a sure cure for generator obsolescence due to increasing electrical demands.

For more information, contact your G-E Apparatus Sales Office or write for Bulletin GEA-5865A. General Electric Company, Locomotive and Car Equipment Department, Erie, Pa. 113-11

BLT 6 51



# ALTERNATOR-RECTIFIER SYSTEMS YOUR CABIN CARS CAN USE

*Progress Is Our Most Important Product*

GENERAL  ELECTRIC

Impartial laboratory\* tests prove...

*Air-Maze oil bath air filter*  
*maintains at least*  
**95% efficiency**  
*even at lowest*  
*engine speeds!*

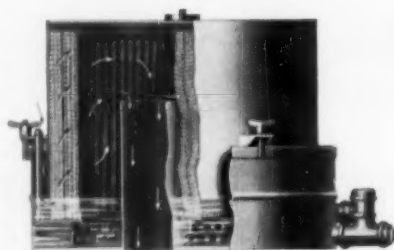
**H**ERE'S WHY dozens of America's leading railroads are switching to Air-Maze oil bath air filters: An independent—completely impartial—testing laboratory compared the Air-Maze oil bath filter with other competing locomotive engine air filtering devices. Here's what they found.

- The Air-Maze oil bath filter *maintains at least 95% efficiency even at the lowest locomotive engine speeds!* Such high filtering efficiency is possible because the Air-Maze oil bath air filter *does not* depend on high air velocity—as do other filtering devices—to deliver peak efficiency all the time!
- Equally important, the laboratory tests show that the Air-Maze oil bath air filter *removes 59% more fine Arizona road dust than the next best filtering device.*

No wonder top railroads are greatly prolonging power assembly life, greatly reducing service costs on hundreds of diesels used in freight, passenger and switching service . . . with Air-Maze oil bath filters. What's more, Air-Maze filters generally *cost no more* than other filtering devices.

**FIND OUT FOR YOURSELF** how you can save wear and maintenance on power equipment. Just write — Air-Maze Corporation, Cleveland 28, Ohio.

\*Laboratory selected by one of our customers. Additional data furnished on request.



Engine air comes clean, scrubbed in a bath of oil — at all engine speeds with this Air-Maze oil bath filter. Abrasive dust and dirt can't get through to wear rings, ring grooves and liners!

*The biggest names in diesels are protected by Air-Maze filters*

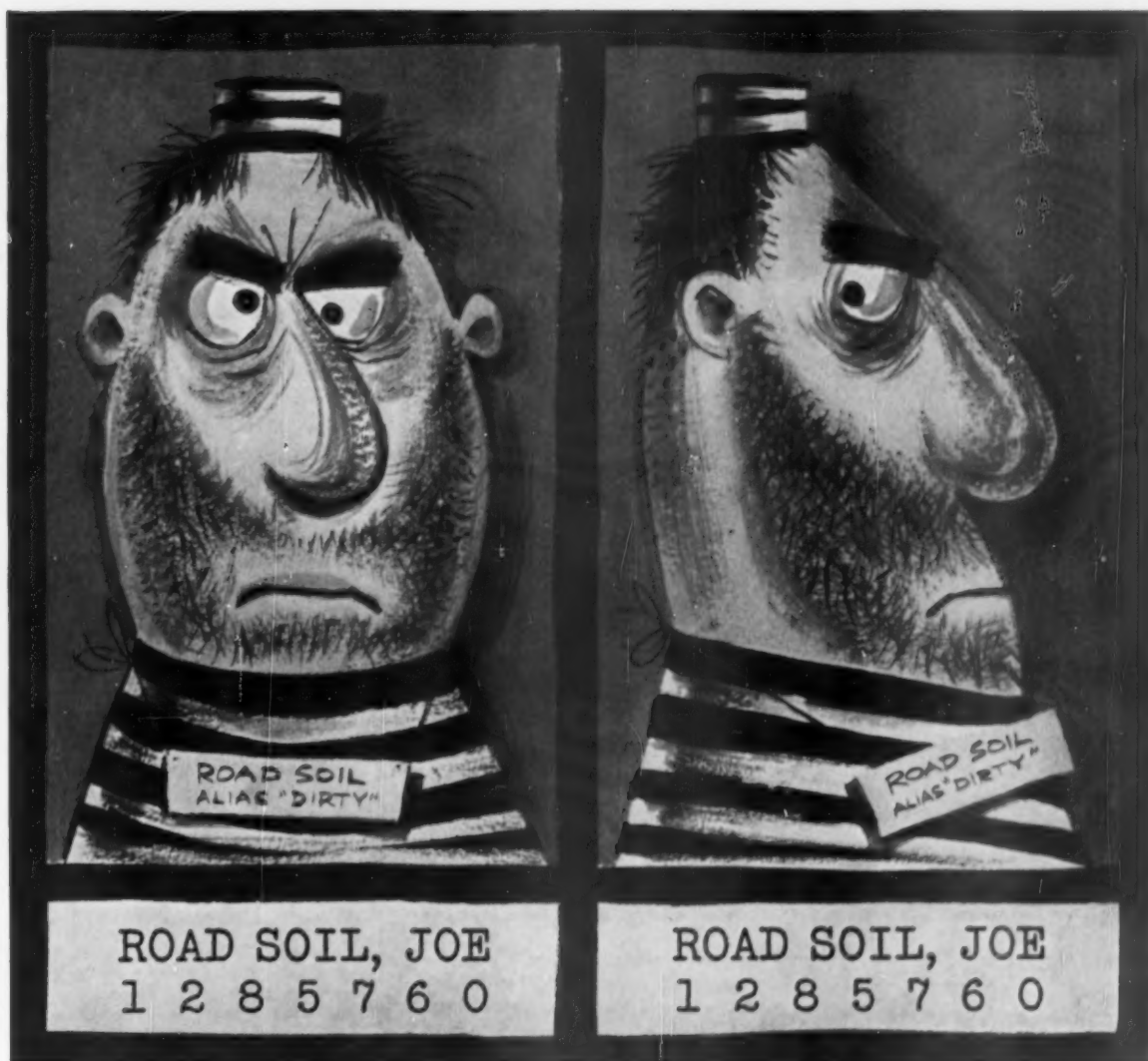
ENGINE AIR FILTERS  
CAR BODY FILTERS

**AIR-MAZE**

**The Filter Engineers**

LUBE OIL FILTERS  
PASSENGER CAR FILTERS





## Crusty running gear COMES CLEAN in Pennsalt Cleaner "50"

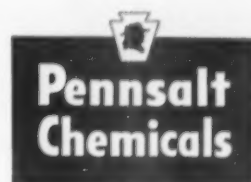
That old hardened criminal, Road Soil, breaks down fast under the penetrating attack of new Pennsalt Cleaner "50". Trucks, running gear, wheels, fuel tanks—everything under a diesel from the underframes to the rails—comes cleaner than ever before with the simple application of this easy new cleaner.

**HOW TO USE Pennsalt Cleaner "50"?** Make up a stock solution in the reserve tank of your pressure spray unit. Shoot Pennsalt Cleaner "50" on running gear

and undercarriage with steam or spray gun, and Road Soil—no matter how corrupt—wilts fast.

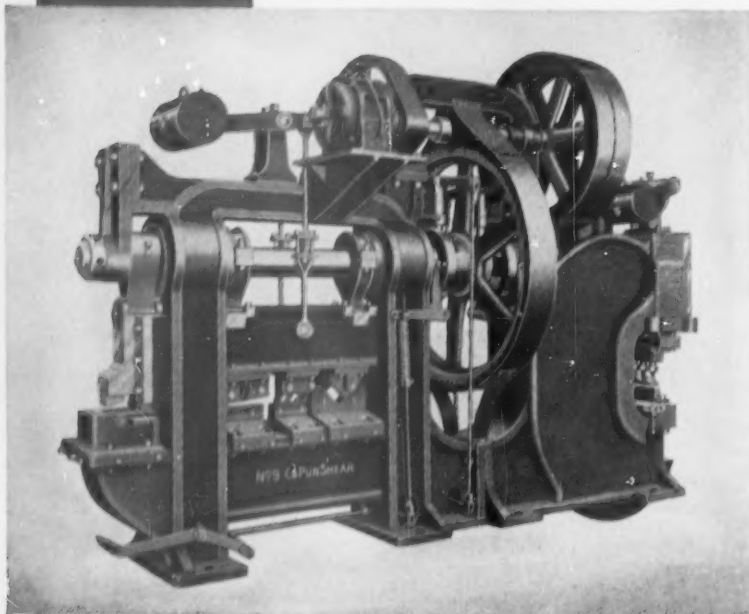
**TRY PENNSALT CLEANER "50"**, the balanced alkaline detergent made to beat toughest cleaning problems on grimeiest diesel running gear. For more information call the Pennsalt man now, or write Metal Processing Dept. 297, Pennsylvania Salt Manufacturing Co., East: Three Penn Center Plaza, Philadelphia 2, Pennsylvania.

West: 2020 Milvia St., Berkeley 4, Calif. In Canada: Pennsalt Chemicals of Canada, Hamilton, Ontario.

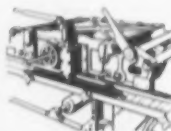


# BEATTY CO PUN SHEAR

## 3-in-1 Machine Speeds Miscellaneous Repair Work



No. 11-B Punch



Spacing Table (SPI Type)

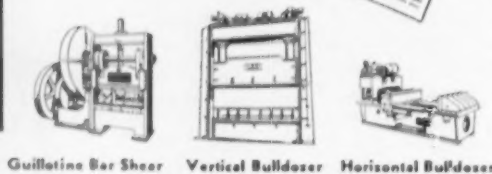
Cope — punch — shear without changing tools! This versatile combination of coping, punching and shearing tools can handle about 90% of the miscellaneous work required in the average repair shop — eliminates the time and work necessary to change tools on ordinary single-end machines. All tools are driven from a single motor and are operated with independent clutches.

Especially engineered to save time and increase output, the Co-Pun-Shear can punch three different diameter holes in one handling. Detachable shearing tool holders speed substitution of tools for special shapes; reduce down time.

**Write For Full Details**

**BEATTY**  
MACHINE & MFG. CO.

962 150th St.  
HAMMOND, IND.



Guillotine Bar Shear    Vertical Bulldozer    Horizontal Bulldozer

digit electromagnetic counters connected to the switches so that each counter tallies the number of times its associated switch operates. Each channel can be factory set to count at any level from 2.5 to 10 g's absolute, in increments of 0.5 g minimum.

The unit is self-contained in a metal housing built for military applications. A standard AN fitting connects the instrument to a 28 volt d-c supply. *Maxson Instruments, Division of W. L. Maxson Corporation, Dept. RLC, 47-37 Austell place, Long Island City 1, N.Y.*



### Water Purifier

The model RT9 Everpure water purifier for diners, coaches, and sleeping cars is not just a filter. The filtering system is said to be so fine that it removes not only foreign particles but eliminates undesirable tastes and odors, such as chlorine.

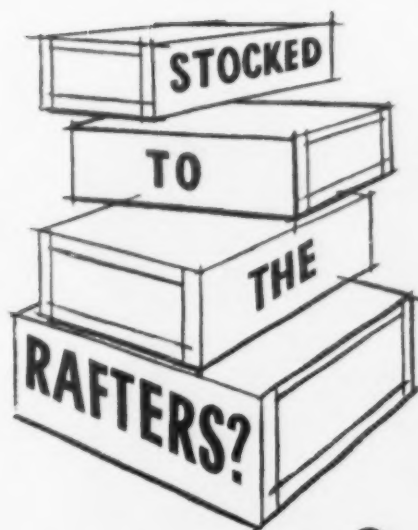
It is said that this unit, after the purchase and installation costs will annually render less than  $\frac{1}{100}$ th of the cost of bottled water. This model is 16 $\frac{1}{2}$  in. high by 10 $\frac{1}{2}$  in. in diameter and is made to fit under a sink, or at the water stations or coffee urns. *Tested Appliance Company, Dept. RLC, 2627 West 19th street, Chicago 8.*

### Diesel Air Horns

There is now on the market a diesel warning horn in which the individual horns are mounted on a standard base to allow wide selection of combinations of pitches for best tone selections. The arrangement also allows quick replacement, if necessary, of one horn without depriving the equipment of the use of the remainder. Should one note need attention, it can be removed and a cover plate attached while the remainder continue in service until the defective unit is repaired or replaced.

One base is used for all horn combinations (one to five) which fit a standard horn mounting pad.

(Continued on page 88)



not with **api** !  
Trade Mark

**API's local service and inventory facilities solve your terminal and tooling stockpiling problems.**

API local service and inventory facilities stock a wide variety of A-MP terminals and tools for your service and maintenance requirements. API inventory and service facilities are as near as your telephone. Call API's nearest branch office for service and expert technical assistance.

*In addition to branch offices, API maintains a group of local telephone information centers for your convenience.*



**dependability  
2 ways**

*The product and  
the product knowledge  
of the API man  
who serves you.*

**AMERICAN PAMCOR, INC.**

*Subsidiary of Aircraft-Marine Products, Inc.*

**181 Hillcrest Ave., Havertown, Pa.**

Atlanta, Ga.	Philadelphia, Pa.	Baltimore, Md.
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AMERICAN PAMCOR INC. for local telephone center number.*



## Large Stocks— Mass produced for low cost

**EX-CELL-O PINS AND BUSHINGS** are saving money for more than 200 railroads and equipment builders. These hardened and ground steel railroad products have been an Ex-Cell-O "specialty" for over 25 years.

Whether you buy one or a thousand, prices are low. Prompt shipment allows you to keep down your inventory.

**EX-CELL-O WAS FIRST** to establish stocks of popular sizes for all types of equipment; and **FIRST** to offer the economy of mass-produced replacement items.



Do you have this recently-revised catalog—or can you use more of them? Write Ex-Cell-O for copies.

54-31

RAILROAD DIVISION

**EX-CELL-O CORPORATION**

DETROIT 32, MICHIGAN



## it's Barber Stabilized trucks **AT BOTH ENDS!**

### THE MECHANICAL DEPARTMENT

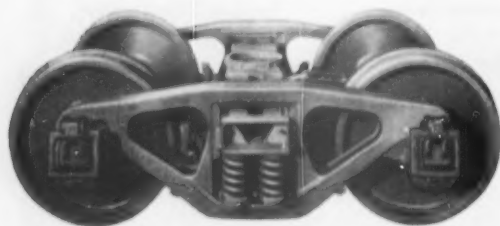
... wants easy dismantling for various servicing operations, *fast* re-assembling, *low* labor costs. Barber Stabilized Trucks ... simple in design and efficient ... provide these advantages.



### THE TRANSPORTATION DEPARTMENT

... wants smooth, easy rides for valuable cargoes — lowered damage claims. Transportation men want to cooperate, too, with mechanical men who *know* how Barber Stabilized Trucks save in maintenance costs. So they agree!

*Specify Smoother-Riding*



# BARBER

## STABILIZED TRUCKS

Standard Car Truck Company, 332 S. Michigan Ave., Chicago 4, Illinois. *In Canada:* Consolidated Equipment Co., Ltd., Montreal 2.

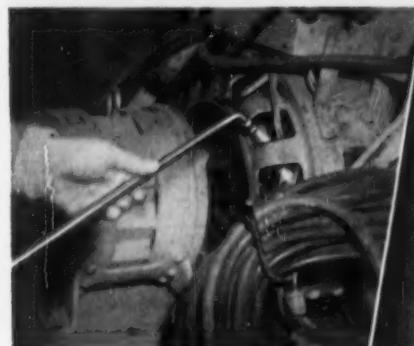




Cleaning trucks, journals and outer surfaces.



Spray cleaning diesel engines.



Cleaning electrical parts.



Removing grit and dirt from filters.



Cleaning upholstery, carpeting, interiors.



Cleaning washrooms.

## Only the right cleaner does the job right

From diesel to lounge car, both inside and out, there is a Dearborn cleaner specifically compounded for each cleaning need. Exterior cleaners that keep outer surfaces shining bright. Cleaners that rid engines, electrical

parts and filters of carbon, oil and grease. Safe, efficient interior cleaners for sparkling, sanitary passenger cars, air conditioning ducts and lavatories. There's a Dearborn cleaner for every railroad requirement.

# Dearborn®

SERVING AMERICA'S RAILROADS SINCE 1887

Dearborn Chemical Company  
Merchandise Mart Plaza, Dept. RL  
Chicago 54, Illinois

Gentlemen: Please send me information on:

- ☐ Dearborn Cleaners and Detergents
- ☐ Dearborn Pressure Cleaning Systems
- ☐ Have a Dearborn Railroad Engineer call

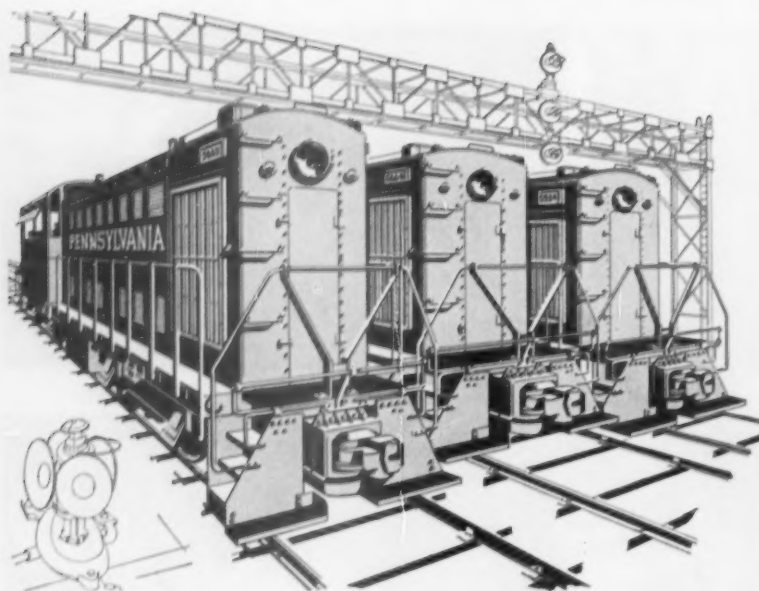
Name..... Title.....

Railroad.....

Address.....

City..... Zone..... State.....





## No water added to **C&D Diesel starting batteries in 16 months!**

These three PRR Diesel switchers have one thing in common—their powerful C & D Slyver-Clad® starting batteries haven't been watered in more than 16 months!

Why? Because these rugged railroad batteries have lead-calcium plates—the most outstanding battery development in 50 years. Lead-calcium batteries are free from the antimony "poisoning" that shortens the life of conventional lead-antimony batteries. Lead-calcium batteries require far fewer water additions because they use 1/10 as much water as conventional batteries.

Add this remarkable plate alloy to C & D's Five-Fold Slyver-Clad insulation and retention which has virtually eliminated shedding, and you have the finest Diesel starting battery available.

### Can you get this in your present Diesel starting battery?



- Up to 50% more life than conventional batteries†
- Once a year water additions†

If your present Diesel starting batteries don't measure up—it will pay you to investigate C & D. Write for Bulletin DL-577/56.

**C&D BATTERIES, INC.**  
*of Conshohocken, Pa.*

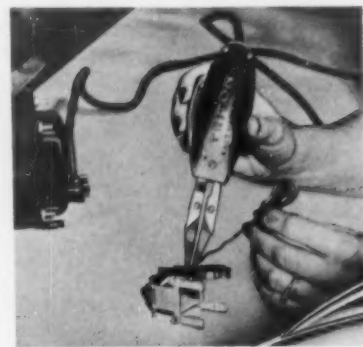
SINCE 1906

SALES AND SERVICE OFFICES IN PRINCIPAL CITIES FROM COAST TO COAST



Maximum dimensions with horns on all five pads are a height of 15 1/4 in., a width of 14 1/4 in., and a length of 20 1/4 in. Weight is 3 1/4 lb for each single note and 8 1/2 lb for the base.

Reversing or mounting horns in any combination is by two bolts. Replacement of the bronze diaphragms can be done without removing the horn from the mounting. Construction is of brass and bronze construction to resist the elements. Buell Manufacturing Company, 919 West 49th Place, Chicago.



### Plier-Action Soldering Tool

This plier-action soldering tool, developed to make good soldering connections in cramped quarters without damaging nearby contacts, is said to heat up or cool off instantly by the operation of a hand lever. Slight pressure brings the jaws in contact with the work piece. Increasing the pressure operates a high-speed snap switch which releases the necessary current to heat the tips. A click, heard and felt by the operator, indicates operation of the switch. Decreasing hand pressure opens the switch cutting off the current, yet the piece is still held until the solder hardens.

Pres-To-Heat, as it is called, is furnished with a lower voltage transformer to provide the lower voltage required to heat the tool. This unit is for 110-volt, 60-cycle a-c operation, units for other currents are available. Triton Manufacturing Company, Dept. RLC, East Haddam, Conn.

### Mercury Lamp

The G-E H1000 RC 15 lamp, rated at 1000 watts, has an interior phosphor reflector which directs 3/4 of the light in a downward pattern. It has the same advantages and characteristics of the H400 RC1 unit.

At a given lighting level, according to the manufacturer, the cost of lighting from the lamp should be about 15 per cent lower than from the H1000 RC 15 lamp. This system also offers better maintenance and improved distribution of light as well as some color improvement.

The lamp is 15 1/8 in. long, has a mogul base, is rated at 53,000 lumens, and can be used in medium and high mountings in industrial installations. General Electric Company, Lamp Division, Dept. RLC, Nela Park, Cleveland 1.

Gulf Quality Dieselmotive oil has an unmatched record for service on scores of the nation's modern railroads.



## The tough lubricant for hard-working diesels **GULF DIESELMOTIVE**

Most of the leading railroads in Gulf's marketing territory use top quality Gulf Dieselmotive. Why? Because it's the tough-filmed, heavy duty detergent oil that helps insure greater availability and lower maintenance costs.



- **SUPERIOR ADDITIVES** insure clean rings, grooves and oil cooling passages . . . protect against excessive piston crown deposits.

- **100% SOLVENT REFINING** (removing undesirable components) guarantees greater stability, effective bearing protection.

- **EFFICIENT DETERGENT ACTION** prevents harmful carbon deposits in hot spots.

- **CAREFULLY SELECTED BASE STOCKS** provide an unusually high resistance to oxidation . . . thus assuring a higher degree of safety.

Gulf Sales Engineers are always ready to help railroads solve *specific* lubrication problems. Just phone, write or wire your nearest Gulf office for prompt service when and where you need it.

**GULF OIL CORPORATION • GULF REFINING COMPANY**

1822 Gulf Building, Pittsburgh 30, Pennsylvania



**THE FINEST PETROLEUM PRODUCTS FOR ALL YOUR NEEDS**



KEY TO RAILROAD PROGRESS . . . ELECTRICAL PIONEERING





# Virginian Railway Company Gets New General Electric Rectifier Locomotives Designed Specifically to Move Heavy Tonnage More Economically

Twelve new General Electric rectifier locomotives will soon be operating on the Virginian Railway. These locomotives, the first rectifier-electrics designed specifically for freight service, will develop 3300 hp, and boast a continuous tractive effort that will permit them to haul heavier freight trains economically.

As designed by G-E engineers, electrical equipment in the locomotive will convert high voltage A-C from the overhead wire to low voltage D-C

that will drive six G-E-752 traction motors. In combination with the power transformers, rectifier tubes form the heart of the conversion system.

For more information about these new electric locomotives, contact your G-E Apparatus Sales Office, or write Section 135-6, General Electric Company, Locomotive and Car Equipment Dept., Erie, Pa.



**ENGINEERS AND WORKMEN** at General Electric's Erie, Pa. Works stand by waiting signal for lowering of locomotive body onto the six-wheel trucks.



**NEW VIRGINIAN RECTIFIER LOCOMOTIVE** sees the sun for the first time on General Electric's test track. This locomotive will soon be operating between Mullins, W. Va., and Roanoke, Va.

*Progress Is Our Most Important Product*

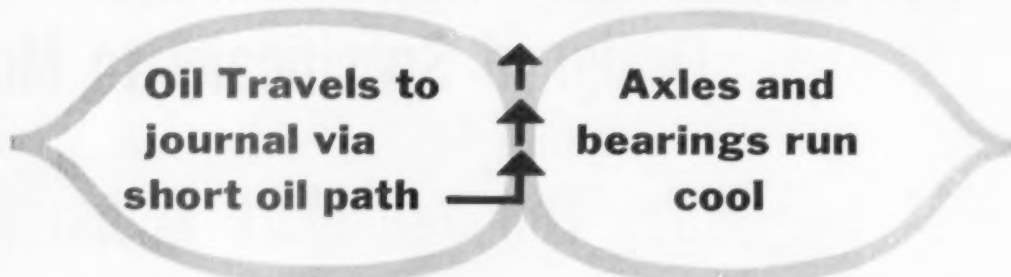
**GENERAL**  **ELECTRIC**

48,000 CARSETS  
MILLER LUBRICATORS  
BEING APPLIED BY  
AMERICAN RAILROADS

# For **Progressive Railroading**

(Approved for interchange)

**MILLER CENTER FEED LUBRICATOR**



- **Volume quantities—immediate delivery**
- **Cost \$40 per carset (for all sizes)**
- **Life expectancy—6 years**

**MILLER LUBRICATOR CO., WINONA, MINN.**

**it's a  
proven fact**

TIME AND MONEY ARE BEING  
SAVED BY USERS OF DEMP-NOCK

**SPRAY IT - STENCILS**

... for reproducing the finest and most durable type of lettering plus designs by the spray-gun method on locomotives, passenger cars and other types of equipment ... accepted and used today by 1/3rd of the major railroads ... let us prove this to you.

WIRE OR WRITE RAILWAY SALES DEPARTMENT

**THE DEMP-NOCK CO.**

21433 MOUND ROAD, VAN DYKE, MICHIGAN



U S A.

Boston • Chicago • Philadelphia • St. Louis • San Francisco • Washington, D. C.

## How Metallizing saves money in railroad shops

**"Cold" metal build-up helps beat skyrocketing replacement costs—speeds maintenance jobs**

### Typical Railroad Metallizing Applications

Engine crankshafts, mains, throws, fits • Engine cylinders, liners, liner flutes • Water jackets, camshaft bearings • Generator, traction motor, other armature shaft bearing fits • Compressor crankshafts • Traction motor end housings • Pump rods and shafts • Eroded or corroded portions of engine blocks • Car lighting generator pulleys • Dents and scratches in car bodies

—practically any worn part repaired at only 15 to 20% replacement cost—get equipment back in service in hours, instead of days or weeks.

### Some of the 28 major railroads using Metallizing:

A.T. & S.F.	Missouri Pacific	Baltimore & Ohio
New York Central	Northern Pacific	Canadian National
Atlantic Coast Line	Pennsylvania	Chesapeake & Ohio

**SPECIAL RAILROAD BULLETIN AVAILABLE**—Illustrates and describes a number of these time-saving, money-saving metallizing applications. Data supplied by railroads using metallizing; photographs taken in user shops. Write for copy.



### Metallizing Engineering Co., Inc.

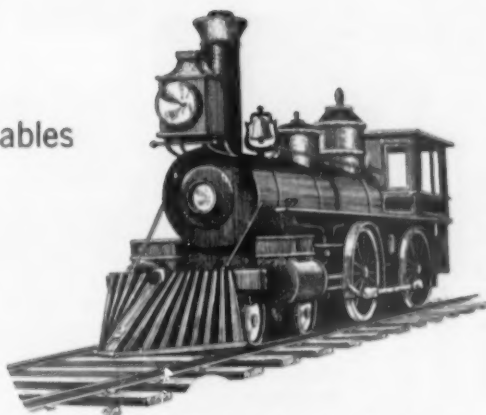
1117 Prospect Ave., Westbury, L. I., New York • cable: METCO

In Great Britain: Telephone: EDGEWOOD 4-1300  
METALLIZING EQUIPMENT COMPANY, LTD.—Chatham near Woking, England



Electrical Wires and Cables

## In step with America's Railroads ever since the single gauge came in...



This locomotive was the finest of its type back around 1890, the year "U.S." began making electrical wires and cables to serve the growing railroad industry.

Year by year, America's railroads become more and more dieselized and electrified. That steps up the demand for electrical wires and cables. But it also means that manufacturers have to turn out wires and cables of tougher specifications, greater durability, wider versatility. The tremendously complex centralized traffic control systems and other "push-button" devices need the finest wires and cables obtainable.

United States Rubber is right in the middle of this tremendous railroad electrification growth. For 66 years "U.S." has been supplying railroads with the wires and cables required—as well as *anticipating* future demands. "U.S." has gone along side by side with the railroads, as they grow into an ever stronger national transportation system—a system unmatched in economy, efficiency and safety.

"U.S." is the only wire and cable manufacturer growing its own natural rubber, making its own synthetic and plastic compounds. Through this unequalled *control of manufacture*, "U.S." can always guarantee *superior insulation* in every type of wire and cable it produces.

Electrical Wire & Cable Department, U. S. Rubber, Rockefeller Center, New York 20, N. Y.



Above is the United States Rubber wire and cable factory in 1890. Below (left) as it looks today.



Just as this up-to-the-minute Diesel typifies the advancement in locomotion, so also "U.S." electrical wires and cables typify leadership in their field, as they have for 66 years.



Electrical Wire & Cable Department

# United States Rubber

**FRAHM® and JAGABI®  
Speed Measuring  
Instruments**

... to meet every requirement  
Write for Bulletin 35-X



**MEGGER®  
Electrical Resistance  
Measuring Instruments**

... for all electric, Diesel-electric locomotives and other  
electrical equipment testing requirements.

Write for File RR #1



**JAMES G. BIDDLE CO.**

Electrical & Scientific Instruments

1316 ARCH STREET, PHILADELPHIA 7, PA.

**BE SURE YOU'RE ON THE RIGHT TRACK**  
ALWAYS SPECIFY

**SUPPLY TRADE NOTES**

(Continued from page 14)

**WALTER KIDDE & CO.**—The Graybar Electric Company has been appointed a distributor in the railway industry for the Kidde line of portable fire extinguishing equipment.

**DANA CORPORATION.**—Ren C. McPherson has been appointed manager of the Auburn, Ind., division, succeeding R. E. Woodcock who has been transferred to the Marion, Ind., division as manager. L. L. Dodge has been appointed assistant general sales manager at Toledo, Ohio.

**WILSON ENGINEERING CORPORATION.**—Douglas Wilson has been elected president, succeeding the late L. F. Wilson.

**THOMAS A. EDISON, INC.**—F. Dudley Lansdell, sales engineer in the Chicago area for Edison Storage Battery division, has been appointed district manager at Chicago, and Kenneth D. Mumbower, Kansas City representative, has been named district manager at St. Louis.

**STANDARD RAILWAY EQUIPMENT MANUFACTURING COMPANY.**—William R. Lindersmith, formerly of Pacific Car & Foundry Company, has been appointed manager of the San Francisco sales office of Standard, succeeding John H. Schroeder, retired.

**TIMKEN ROLLER BEARING COMPANY.**—Howard T. Starn, assistant chief engineer, has been appointed superintendent of the Railroad Bearing Division for the Columbus, Ohio, plant.

**NEW YORK AIR BRAKE COMPANY.**—John A. Vaughan has been appointed manager-engineering of the Watertown Division to succeed Karl W. Galliger, recently appointed director of engineering.

**GREENVILLE STEEL CAR COMPANY.**—George C. Brecht has been appointed vice-president, sales, and John T. Egbert, Jr., assistant to the vice-president, sales. Mr. Brecht was formerly general manager of sales.

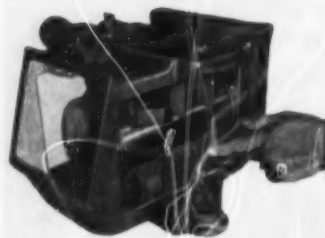
**HUCK MANUFACTURING COMPANY.**—Allen R. Tenny has been appointed eastern division sales manager; William Messer, mid-west division sales manager, and Robert B. Brackeen, sales engineer, covering Texas, Oklahoma, Arkansas, Mississippi & Louisiana.

**CHROMIUM CORPORATION OF AMERICA.**—William B. Thornton has been appointed sales engineer.

**BUCKEYE STEEL CASTINGS COMPANY.**—George T. Johnson, Jr. has been appointed southeastern representative, succeeding Jacob C. Larsen, retired.

Journal **BOX-PAD** Lubricator

Reversible Package Type



To solve your  
**HOT BOX  
PROBLEMS**

Simple to apply and maintain. It fits snugly against the underside of the journal at all times, regardless of the brake application or side lateral. Eliminates the possibility of waste grab and will NOT glaze.

Price \$35.00 per car set of 8—f.o.b., Raleigh, N. C.

Here at last is the answer to the pressing problem of Successful Journal Lubrication, free of Hot Box worries. Our lubricator fits all conventional solid bearing journal boxes, with no modification. Insures positive action with capillary attraction at all times, regardless of Out-Side temperature.



**SEABOARD LUBRICATOR & MFG. CO., INC.**

W. J. Sockell, Sr., President

P. O. Box 11193

RALEIGH, N. C.





**... guards perishables under ALL conditions!**

Major refrigerator car builders have been using all-hair insulation for nearly half a century — and today they specify Streamlite HAIRINSUL because of its 40% less weight, higher efficiency and greater economy.

At any location, at any temperature Streamlite HAIRINSUL provides maximum protection to valuable shipments of perishables.

Yes, Streamlite HAIRINSUL assures you all the major advantages listed at the right — and more besides. Write for complete data.

**AMERICAN HAIR & FELT COMPANY**  
Merchandise Mart • Chicago, Illinois

- **LOW CONDUCTIVITY** — Thoroughly washed and sterilized, all-hair heat barrier. Rated conductivity — .25 btu per square foot, per hour, per degree F., per inch thick.
- **LIGHT WEIGHT** — Advanced processing methods reduce weight of STREAMLITE HAIRINSUL by 40%.
- **PERMANENT** — Does not disintegrate when wet, resists absorption. Will not shake down, is fire resistant and odorless.
- **EASY TO INSTALL** — Blankets may be applied to car wall in one piece, from sill to plate and from one side door to the other. Self-supporting in wall section between fasteners.
- **COMPLETE RANGE** — STREAMLITE HAIRINSUL is available ½" to 4" thick, up to 127" wide. Stitched on 5" or 10" centers between two layers of reinforced asphalt laminated paper. Other weights and facings are available.
- **HIGH SALVAGE VALUE** — The all-hair content does not deteriorate with age; therefore has high salvage value. No other type of insulation offers a comparable saving.



**SETS THE STANDARD BY WHICH ALL OTHER REFRIGERATOR CAR INSULATIONS ARE JUDGED.**



**FLUSH FIT  
MOISTURE  
TIGHT..**

**...WITHOUT  
COUNTERSINKING**

**Lewis sealrite car bolts**

Each Lewis Sealrite car bolt has special "wood engineering" beveled head for flush, moisture tight, fit... without countersinking. Standard and large-head car bolts have patented fins that grip wood, prevent turning... slotted head bolt can be set with screwdriver. Available in Hot-Dip galvanized finish for "Long Life Economy," in black for low first cost. Call, write or wire for sample prices.

All products manufactured in the U.S.A. to A.S.T.M. specification.

**Lewis**

**BOLT & NUT COMPANY**  
304 Malcolm Ave. S. E.  
MINNEAPOLIS 14, MINNESOTA



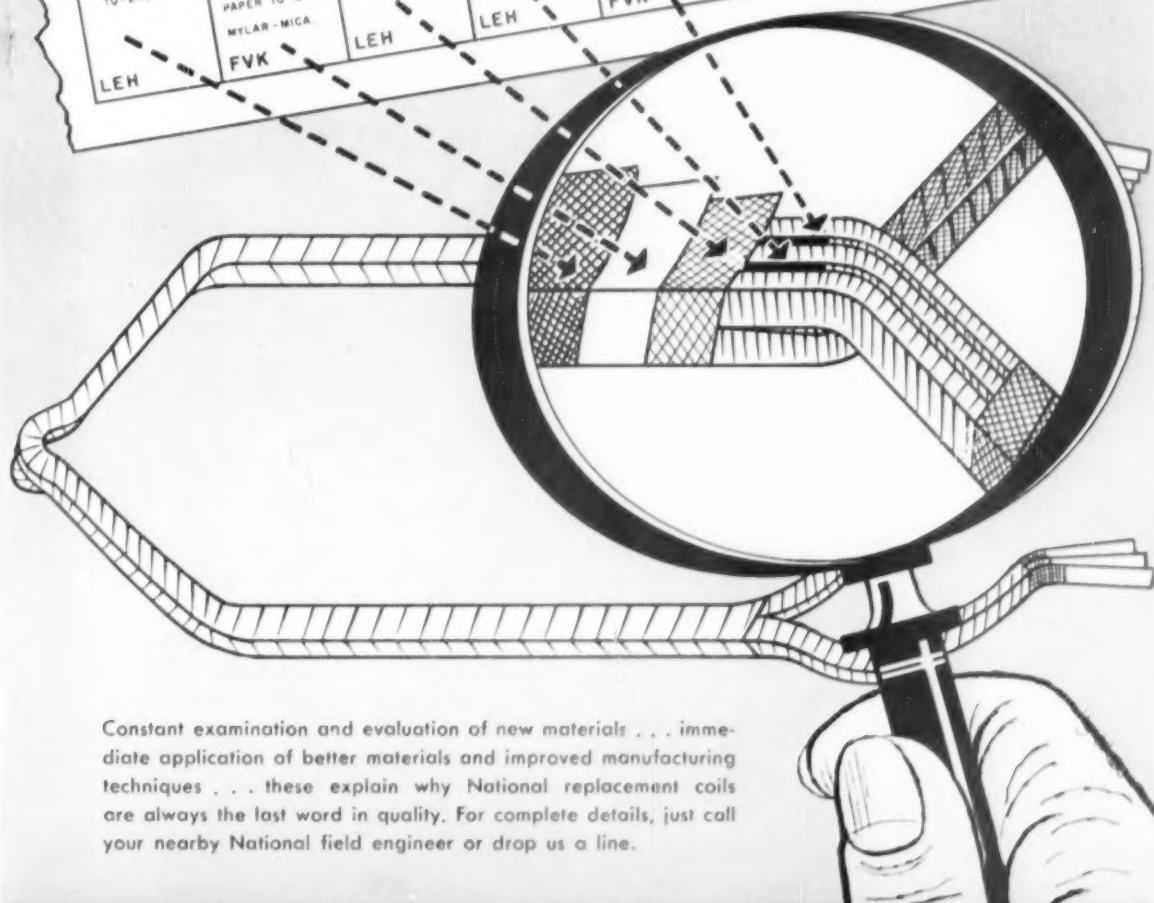
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# CONTINUAL IMPROVEMENT MAKES NATIONAL REPLACEMENT COILS THE LAST WORD IN QUALITY

REVISIONS					Care Data Furnished By: FVK 3/25/52	
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CHANGED VARNISH FROM 2A120 TO 2A220.	CHANGED WRAPPER FROM 007" MICA ROPE PAPER TO 008" MYLAR-MICA.	CHANGED FROM BA48 MICA TAPE TO SIL BOND BA96.	CHANGED FROM S. PAPER STIFFENERS TO S. GLASS.	CHANGED FROM DFG WIRE TO SILICONE DOUBLE DACRON GLASS	Drawn by: FVK	Approved: <i>FVK</i> 3/27/52
LEH	FVK	LEH	LEH	FVK	Traced by: LW	Date: 3/25/52
					DWG. NO.	101 - 496



Constant examination and evaluation of new materials . . . immediate application of better materials and improved manufacturing techniques . . . these explain why National replacement coils are always the last word in quality. For complete details, just call your nearby National field engineer or drop us a line.

## NATIONAL ELECTRIC COIL COMPANY

COLUMBUS 16, OHIO, U. S. A.



ELECTRICAL ENGINEERS: MAKERS OF ELECTRICAL COILS AND INSULATION—  
REDESIGNING AND REPAIRING OF ROTATING ELECTRICAL MACHINES



## Why 7 out of 10 roller bearing freight cars roll on TIMKEN® tapered roller bearings

**T**HE big switch to "Roller Freight" is on! More and more railroads are putting freight cars on roller bearings—to eliminate the hot box problem and to cut maintenance and operating costs to a bare minimum. And seven out of ten roller bearing cars are rolling on *Timken®* bearings. This tremendous preference is because Timken tapered roller bearings are the only bearings that deliver what you expect to get from roller bearings.

Here's why. The taper prevents lateral movement within the bearing. There's no pumping of lubricant through the seal and out of the journal box—saving lubricant and reducing diesel locomotive wheel slippage. There's no scuffing of rollers and races to cause wear and shorten bearing life. Timken bearings *roll* the load. They never slide it. No metal-to-metal sliding friction.

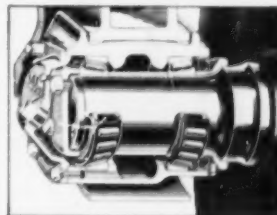
And because of the taper, roller ends are held snug against the rib, where wide area contact keeps rollers properly aligned. *Positive* roller alignment is assured. There's no skewing of rollers to upset full line contact.

Timken bearings slash bearing inspection and lubrication costs.

They cut terminal bearing inspection time 90%, reduce lubricant costs as much as 95%.

When all railroads go "Roller Freight" they'll save an estimated \$224 million—earn about a 22% return on the investment. And the additional investment needed to equip freight cars with roller bearings is less than ever! The cost of "crutch" devices used in an attempt to keep friction bearings going has narrowed the price gap between roller bearings and friction bearings.

Add 'em up, and you'll see why 54 railroads and private car owners have already gone "Roller Freight". Why 7 out of 10 roller bearing freight cars roll on Timken bearings. Why more railroads are going "Roller Freight"! The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".



# TIMKEN

TRADE-MARK REG. U.S. PAT. OFF.

TAPERED ROLLER BEARINGS ROLL THE LOAD